Scientific American.

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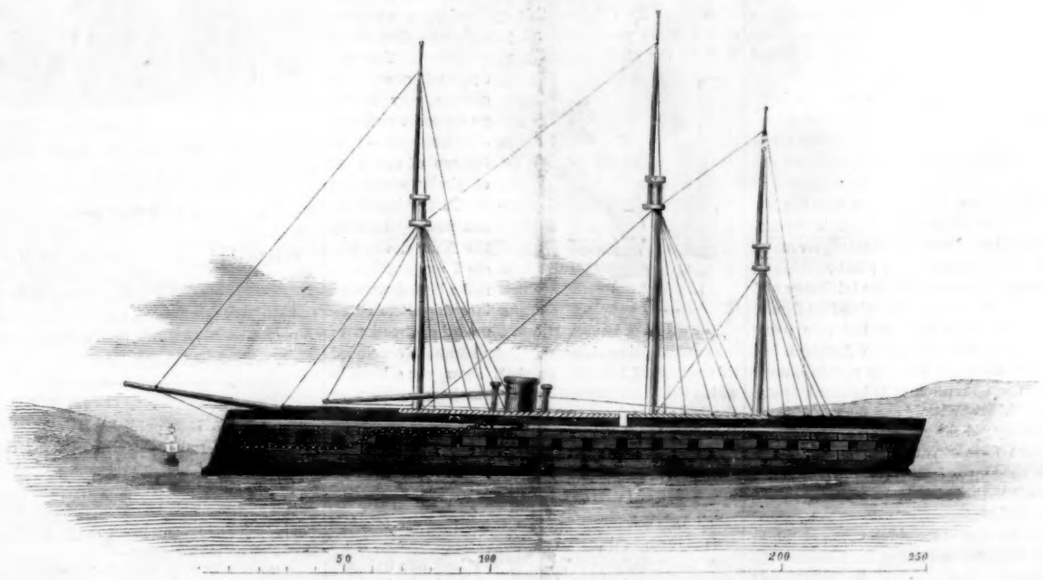
"LA GLOIRE."

For 200 years England has been the acknowledged mistress of the seas, but her great rival, France, has looked with ever-increasing jealousy upon this supremacy. During the two years of the French republic, after the overthrow of Louis Philippe, when the government was directly under the influence of the people, this jealousy manifested itself in the appointment of a commission to inquire into the state of the French navy and devise means for its improvement. In the able report of this commission, the position is distinctly taken that the object of France in increasing her navy is to surpass England in this element of power, and during the eleven years which have since elapsed this object has been pursued with remarkable steadiness and vigor, notwithstanding the great change in the government; the politic Emperor shrewdly making himself the agent of the nation's will in this matter. During the last decade France has created a navy larger than any the nation had ever before possessed.

But while this navy has been in process of creation, the neighboring rival has not looked idly on at the building up of a force for the express purpose of wresting from her grasp the power which she has so long enjoyed. As France increased her navy, England also increased hers, and thus has been exhibited for the last ten years, the most stupendous efforts for the mastery of the seas that the world has ever seen.

As England has about five millions of tuns of mercantile shipping, while France has only about one million, the great superiority of England in sailors as well as in money, must make the efforts of France to surpass her in naval power entirely hopeless. The concentration of authority in the hands of the Emperor may enable him, by directing the whole resources of the nation upon the effort, to obtain a temporary superiority. It would seem that he is now engaged in such an effort. Some months since, he ordered the construction of a number of large iron-plated ships to be finished and ready for sea in the Spring of 1861. The engineer who was appointed to the responsible position of superintendent of their construction, was M. Depuis de Lome, and the result has well justified the wisdom of the selection. He was called upon to construct vessels for novel purposes to be used under peculiar conditions, and after completing his calculations, he boldly laid down the lines for several of these ships, without waiting for the first one to be tested. One of these vessels is finished and has made three voyages, and her brilliant success in every respect has raised the reputation of de Lome to the highest point among the engineers of England as well as those of France. She is named *La Gloire*, and we herewith present an engraving of her, which we transfer from the London *Mechanics' Magazine*.

She is about 250 feet long, 51 feet wide, and displaces 5,000 tuns. Her engines are of 900-horse power. They were built at Marseilles by the "Société des Forges et Chantiers. The construction and performance of these engines have so pleased the Emperor that he has named the director of the company, M. Guiguer, Chevalier of the Legion of Honor. *La Gloire* carries one battery of 34 guns, at a level of only about 6 feet above the sea, and she has 2 long-range guns on the forecastle. On the quarter deck is an iron redoubt, to protect the master at his post. She is built of wood, and entirely covered, above water, with hammered, wrought iron plates, 4½ inches thick.



THE FRENCH IRON-PLATED FRIGATE "LA GLOIRE."

We have already given an account of the admirable sailing qualities of this famous ship. She made 13 1/10 knots per hour, and averaged 12 31/100 knots for 10 hours, a speed which is said never to have been equaled by any other steam frigate.

A New Feathering Paddle Wheel.

The steamboat *Anna* having been recently fitted with one of Densmore's feathering paddle wheels, on which a patent was issued Dec. 4, 1860, made a short experimental trip a few days ago, on which occasion we were present with other members of the press and several representatives of steamboat companies.

The feathering action of this wheel is similar to that of Galloway's and many others which have been, from time to time, before the public; but, in many respects, it is superior to any of this class of wheels which we have ever seen operate in any of our steamboats.

It is difficult, without an illustration, to describe the peculiar novelty of parts which render this wheel superior to or different from others of similar construction which we have before described; but we will try to describe this novelty so that our nautical engineers will probably understand its operation. The buckets are attached by hinge joints of peculiar construction to brackets which are bolted to the arms and rim, and each bucket has rigidly attached to one end an arm, the extremity of which is furnished with a pivot which is fitted into a block or box that is arranged to slide in one of a series of radial grooves or slots in an eccentric, which is caused to revolve by and with the shaft; the bucket arms working in the slots of the eccentric, as the latter rotates with the wheel, causes the buckets to have the desired feathering movement.

The novelty consists more particularly in the construction and arrangement of the details of the wheel whereby it is made strong and little liable to get out of order, without being objectionably heavy, and convenience is afforded for replacing its wearing parts.

A feathering wheel is admitted to be, theoretically, the best plan ever tried; but the necessary complication in their construction, and the corresponding liability to get out of order, have heretofore prevented their introduction to any great extent. Most of these defects the inventor of this new wheel claims to have overcome, and certainly the performance of the *Anna* goes far to confirm his claim.

Sir Isaac Newton's House.—Between Leicester square and Trafalgar square, London, still stands in its integrity the house occupied by Sir Isaac Newton. There were all his mighty and magnificent speculations pondered over. There his mind worked, and there immortal treatises were composed. Assuredly that house should be regarded and preserved by all Englishmen as an almost sacred shrine; and if it were so treated by them, no doubt it would be, as such, visited by men of science from all parts of the globe. What now is its condition? It is falling into decay, and is made use of as—a poor-school!

THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A Course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

LECTURE I.—Continued.

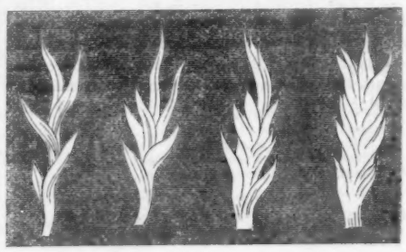
A Candle—The Flame—Its Sources—Structure—Mobility—Brightness.

There is another condition which you must learn as regards the candle, without which you would not be able fully to understand the philosophy of it, and that is the vaporous condition of the fuel. In order that you may understand that, let me show you a very pretty but very common-place experiment. If you blow a candle out cleverly, you will see the vapor rise from it. You have, I know, often smelt the vapor of a blown-out candle, and a very bad smell it is; but if you blow it out cleverly, you will be able to see pretty well the vapor into which this solid matter is transformed. I will blow out one of these candles in such a way as not to disturb the air round about it, by the continuous action of my breath; and now, if I hold a lighted taper two or three inches from the wick, you will observe a train of fire going through the air till it reaches the candle. I am obliged to be quick and ready, because if I allow the vapor time to cool, it becomes condensed into a liquid or solid, or the stream of combustible matter gets disturbed.

Now, as to the shape or form of the flame. It concerns us much to know about the condition which the matter of the candle finally assumes at the top of the wick, where you have such beauty and brightness as nothing but combustion or flame can produce. You have the glittering beauty of gold and silver; and the still higher luster of jewels like the diamond and ruby; but nothing of these comes by comparison near to the brilliancy and beauty of flame. What diamond can shine like flame? It owes its luster at night time to the very flame shining upon it. The flame shines in darkness, but the light which the diamond has is as nothing, until the flame shines upon it, when it is brilliant again. The candle alone shines by itself and for itself, or for those who have arranged the materials. Now, let us look a little at the form of the flame as you see it under the glass shade. It is steady and equal, and its general form is that which is represented in the diagram, varying with atmospheric disturbances, and also varying with the size of the candle. It is a bright oblong, brighter at the top than toward the bottom, with the wick in the middle, and beside the wick in the middle certain darker parts toward the bottom where the ignition is not so good as in the part above. I have a drawing here, made many years ago by Hooker, when he made his investigations. It is the drawing of the flame of a lamp, but it will apply to the flame of a candle. The cup of the candle is the vessel or lamp; the melted spermaceti is the oil; and the wick is common to both. Upon that he sets this little flame, and then he represents what is true, a certain quantity of matter rising about it which you do not see, and which, if you have not been here before, or are not familiar with the subject, you will not know of. He has here represented the parts of the surrounding atmosphere that are very essential to the flame and that are always present with it. There is a current formed, which draws the flame out, for the flame which you see is really drawn out by the current, and drawn upward to a great hight, just as Hooker has here shown you, by that prolongation of the current in the diagram. You may see this by taking a lighted candle and putting it in the sun so as to get its shadow thrown on a piece of paper. What a remarkable thing it is that that thing which is light enough to produce shadows of other objects, can be made to throw its own shadow on a piece of white paper or card, so that you can actually see streaming round the flame something which is not part of the flame, but is ascending and drawing the flame upwards. Now I am going to imitate the sunlight, by applying the voltaic battery to the electric lamp. You now see our sun and its great luminosity; and by placing a candle between it and the screen, we get the shadow of the flame. You observe the shadow of the candle and of the wick; then there is a darkish part, as represented in the diagram, and then a part which is more distinct. Curiously enough, however, what we see in the shadow as the darkest part of the flame is, in reality, the brightest part, and here you see streaming upward the ascending current of hot air, as shown by Hooker, which draws out the flame, supplies it with air, and cools the sides of the cup of melted fuel.

I can give you a little further illustration for the purpose of showing you how flame goes up or down according to the current. I have here a flame—it is not a candle flame—but you can, no doubt, by this time generalize enough to be able to compare one thing with another—what I am about to do is to change the ascending current that takes the flame upward into a descending current. This I can easily do by the little apparatus you see before me. The flame, as I have said, is not a candle flame, but it is produced by alcohol so that it shall not smoke too much. I will also color the flame with another substance, so that you may trace its course, for with spirit alone you could hardly see enough to have the opportunity of tracing its course of action. By lighting this spirit-of-wine, we have then a flame produced, and you observe that when held in the air it naturally goes upward. You understand now easily enough why flames go up under ordinary circumstances—it is because of the draft of air by which the combustion is formed. But now by blowing the flame down, you see I am enabled to make it go downward into this little chimney, the direction of the current being changed: Before we have concluded this course of lectures, we shall show you a lamp in which the flame goes up, and the smoke goes down, or the flame goes down and the smoke goes up. You see, then, we have the power in this way of varying the flame in different directions.

There are now some other points which I must bring before you. Many of the flames you see here vary much in their shape by the currents of air blowing around them in different directions; but we can, if we like, make flames so that they will look like fixtures, and we can photograph them—indeed, we have to photograph them—so that they become fixed to us, if we wish to find out everything concerning them. That, however, is not the only thing I wish to mention. If I take a flame sufficiently large, it does not keep that homogeneous, that uniform condition of shape, but it breaks out with a power of life which is quite wonderful. I am about to use another kind of fuel, but it is truly and fairly representative of the wax or tallow of a candle. I have here a large ball of cotton, which will serve as a wick. And, now that I have immersed it in spirit and lit it, in what way does it differ from an ordinary candle? Why, it differs very much in one respect, that we have a vivacity and power about it, a beauty and a life utterly unlike the light presented by a candle. You see those fine tongues of flames rising up. You have the same general disposition of the mass of the flame from below upward, but, in addition to that, you have this remarkable breaking out into tongues which you do not perceive in the case of a candle. Now, why is this? I must explain it to you, because when you understand that perfectly, you will be able to follow me better in what I have to say hereafter. I suppose some here will have made for themselves the experiment I am going to show you. Am I right in supposing that anybody here has played at snapdragon? I do not know a more beautiful illustration of the philosophy of flame, as to a certain part of its history, than the game of snapdragon. First, here is my dish; and let me say, that when you play snapdragon well you ought to have the dish well warmed; you ought also to have warm plums and warm brandy, which, however, I have not got. When you have put the spirit into your dish, you have the cup and the fuel; and are not the raisins acting like wicks? I now throw the plums into the dish, and light the spirits, and you see those beautiful tongues of flame that I have referred to. You have the air creeping in over the edge of the dish forming these tongues. Why? Because through the force of the current and the irregularity of the action of the flame, it cannot flow in one uniform stream. The air flows in so irregularly that you have, what would otherwise be a single image, broken up into a variety of forms, and each of these little tongues has an independent existence of its own. Indeed, I might say, you have here a multitude of independent candles. You must not imagine that because you see these tongues all at once, that the flame is of this particular shape. A flame of that shape is never so at any one time. Never is a body of flame like that which you just saw rising from the ball, of the shape it appears to you. It consists of a multitude of different shapes, succeeding each other so fast that the eye is only able to take cognizance of them all at once. In former



times, I purposely analyzed a flame of that general character, and this diagram shows you the different parts of which it is composed. They do not occur all at once; it is only because we see these shapes in such rapid succession that they seem to us to exist all at one time.

It is too bad that we have not got further than my game of snapdragon, but we must not, under any circumstances, keep you beyond your time. It will be a lesson to me in future to hold you more strictly to the philosophy of the thing than to take up your time so much with these illustrations.

Extraordinary Shower of Stones.

The London *Times* publishes an extract from a letter received from India, describing an extraordinary fall of large slabs of meteoric stones, preceded and followed by most singular physical convulsions, at a place called Dharam Sal, northeast of the Punjab, among the mountains in the lower range south of the Himalaya. The writer says:—

On the 28th of July, horrible discordant noises rumbled forth from the bowels of the earth, following each other with the utmost rapidity. Then succeeded long and loud explosions, which gradually decreased in degree and duration. Then came intensely luminous flames of fire, each flame about twelve feet in length, shooting with extreme velocity from north to south, as though belched forth from the mouth of ordnance of extraordinary size and caliber. These, again, were replaced by a shower of meteoric stones, which, wherever they fell, plowed up the earth like so many cannon balls. I subsequently strolled over the "field of destruction," and discovered a number of boulders and meteoric stones of divers forms and sizes, many of which bore a great resemblance to ordinary cannon balls just discharged from the engines of war, but which, when touched by me, felt like so many pieces of ice.

This looks something like a lunar story of the "Moon Hoax" stamp, although it is well known that in some of the great plains in Australia the ground is covered with large round stones of granite and quartz, which appear as if they had been discharged from celestial artillery.

Precautions in Using Zinc.—A report of a committee appointed by the Central Society of Architects, in Paris, recommends "that zinc, which was at first rejected, but is now so generally used, should be applied with great care, as certain precautions, very simple, but never to be overlooked, are indispensable. Thus: contact with plaster, which contains a destructive salt, is to be avoided; also, contact with iron, which is very injurious, and liable to cause a rapid oxydation. Eave gutters should always be supported by galvanized brackets, and no gutter or sheet zinc should be laid on oak boards."

Signs of Rain.

The "Signs of Rain" were addressed by the celebrated Dr. Jenner to a friend.

The hollow winds begin to blow,
The clouds look black, the glass is low;
The soot falls down, the spaniels sleep,
The spiders from their cobwebs peep.
Last night the sun went pale to bed:
The moon in halos hid her head;
The boding shepherd heaves a sigh,
For see! a rainbow spans the sky!
The walls are damp, the ditches smell:
Closed is the pink-eyed pimpernel.
Hark! how the chairs and tables crack!
Old Betty's joints are on the rack.
Loud quack the ducks—the peacocks cry:
The distant hills are seeming nigh.
How restless are the snorting swine!
The busy flies disturb the kine.
Low o'er the grass the swallow wings;
The cricket, too, how loud it sings!
Puss, on the hearth, with velvet paws,
Sits smoothing o'er her whiskered jaws,
Through the clear stream the fishes rise,
And nimbly catch the incautious flies,
Cropping the meads with eager bite.
Though June, the air is cold and chill;
The mellow blackbird's voice is still.
The glow-worms, numerous and bright,
Illumed the dewy dell last night.
At dusk the squalid toad was seen,
Hopping and crawling o'er the green:
The frog has lost his yellow vest,
And in a dingy suit is dress'd.
The leech, disturb'd, is newly risen,
Quite to the summit of his prison:
The whirling winds the dust obeys,
And in the rapid eddy plays:
My dog, so altered in his taste,
Quits mutton bones, on grass to feast:
And see yon rooks, how odd their flight,
They imitate the gliding kite:
Or seem precipitate to fall,
As if they felt the piercing ball.
'Twill surely rain; I see, with sorrow,
Our jaunt must be put off to-morrow.

Photographing Curious Old Manuscripts of the Bible.

The Paris correspondent of the *Photographic News* writes as follows:—

At the northwestern extremity of the Ægean Archipelago, that sea is indented by a large peninsula, which terminates in three remarkable smaller peninsulas. The most easterly of the three is the peninsula of Athos, about 40 miles long by 4 broad; it is mountainous, and cut by numerous ravines. At the foot or the extremity of the peninsula stands the mountain which has given to it its name. Mount Athos is about 6,300 feet high. It is altogether a unique situation, and has therefore been an object of interest both to ancients and moderns. The Christians early regarded it with religious veneration, and built upon it many chapels and places of devotion, some of which may be dated back as early as the time of Constantine. The monasteries of this mountain are twenty in number, and some of them are surmounted by high turrets; they have been the depositaries, in several instances, of very valuable libraries, well preserved treasures of which have made important additions, within the last century, to our Greek classic literature. The number of monks in these convents is estimated at 8,000. The mountain—and, indeed, the whole peninsula—is called the "Holy Mountain." No female, not even of animals of any kind, is permitted to enter the peninsula. The monks devote themselves to a life of the most rigid asceticism. Mount Athos is a perfect treasury of early Christian art, the contents of which have been preserved intact. Several years ago, Monsieur Durand, who visited it, obtained a copy of a curious manuscript—a manual of iconology, containing formulæ or "practical instructions" for missal painters and others, for treating of every scriptural subject from the Creation down to the last chapter of St. John's Revelation; together with numerous recipes for the preparation and employment of all the material for the painter's craft. Art literature can show no more curious or interesting work than this same manual; its quaintness and simplicity were quite fascinating and amusing, and it formed the very *beau ideal* of Pre-Raffaellitism. But the treasures of Mount Athos must have ever remained a sealed book to the world, had not the aid of photography been invoked; a few fac-similes and descriptions were occasionally doled out to us by favored travelers, but now M. de Sevastianoff—whose name must be familiar to you, as one of the most accomplished photographers—has returned, after three years' residence at the monasteries, which period of time has been zealously devoted to photographing the wonders and marvels of this interesting spot. He brought with him no less than 4,500 negatives, which include every object of interest—views of the convents, with all their curious and interesting architectural features and details; manuscripts of the greatest antiquity; paintings produced centuries ago—all have been copied with the scrupulous fidelity peculiar to photography. There are entire manuscript Bibles, reproduced page by page, with all their naïve illuminations; complete plans of churches by unknown architects, and geographical maps which date from the earliest Christian times. There are also collections of splendid initial letters, copied from manuscripts of the highest antiquity, together with church ornaments and costumes of various epochs. Without question, these intelligent labors of M. de Sevastianoff form one of the most curious and important, if not the most valuable, contributions to art and archæology hitherto made by photography, and it is most devoutly to be hoped that M. de Sevastianoff will be induced to publish these unique productions, and not confine them to the narrow sphere of a museum or portfolio.

Colonel Shaffner and the North Atlantic Telegraph.

Dr. Rae (says the London *Mechanics' Magazine*) pays a well merited tribute of respect to his colleagues. He says:—"Colonel Shaffner and Lieutenant Von Zeilau (one of the Danish Commissioners) accompanied me on the journeys across Stromoe and Iceland, and I cannot close this brief letter without expressing the deep sense of obligation I am under to these gentlemen: to the former for his excellent practical advice and counsel in any case of difficulty; to the latter for his zeal and energy in general, and especially for the valuable services arising from his perfect knowledge of the languages of the people among whom we traveled." The above journal then observes:—"We think it only fair to add to this an expression of our own admiration of the conduct of Colonel Shaffner in connection with this Fox expedition. Every one acknowledges that Colonel Shaffner was the active and laborious initiator of this project. He long since committed his time, his property, and even his life, to this enterprise, and worked in it against opposing influences which would have driven all spirit and hope out of most men. And this he did out of pure love for the task which he courageously set himself, and not for any personal purposes of his own, as is proved by the fact that, from the day Mr. Croskey gave him the first word of encouragement up till now, he has been content to work for the furtherance of the enterprise in any capacity, and to sink all personal claims and desires in order that its success may be secured. We are so accustomed to suspect Americans of selfish objects that it is not easy to give even one of them credit for unselfish motives; but we have had opportunities of closely observing Colonel Shaffner's course in connection with this business, and we believe there is not a man among the promoters of this great international work who is laboring with purer motives or nobler aims than Colonel Shaffner. It affords us real pleasure to bear this testimony—testimony such as we seldom feel it our duty to proffer."

Coal in Utah.—Coal is believed to exist in large quantities in the Great Basin of Utah. On the Weber river, a tributary of Great Salt Lake, from the western slope of the Wahsatch range, coal is now regularly mined and selling at the pits for $5 per tun, though the price in Salt Lake City is $25, on account of the expense of transportation. Should this coal prove to be of good quality, one great obstacle in the way of a Pacific Railroad will be removed, viz., a scarcity of fuel for locomotives. Wood is extremely scarce on the plains this side of the Rocky Mountains, while in the Great Basin there is even less. The discovery of coal near the center of the projected route, therefore, is exceedingly fortunate.

Gwynne's Gas Compresser.—The apparatus for compressing elastic fluids, illustrated on page 54 of the current volume, which was introduced into England by Mr. Sommeiller, of Turin, appears to have been copied from Gwynne's improved gas pump, which was described and illustrated on page 184, Vol. III., of the Scientific American. The Italian probably got his idea from the illustration of Gwynne's apparatus in our paper.

The *Lake Superior Miner* says that the largest mass of copper yet obtained arrived at Ontonagen on January 10th. It weighs 13,000 lbs.—6½ tuns.

AMERICAN NAVAL ARCHITECTURE.

[Reported for the Scientific American.]

THE IRON STEAMER "LOUISIANA."

The intended service of this iron propeller is the Southern trade. She is owned by the Messrs Flanagan, of Philadelphia. Her hull and machinery were constructed by Messrs. Harlan, Hollingsworth & Co., of Wilmington, Del. Her model betokens a rare combination of speed with sea going qualities, and she is confidently expected by her well known builders to prove a complete success. We herewith subjoin the particulars of her hull and machinery:—

Length on deck, 147 feet; length at load line, 140 feet; breadth of beam (molded), 27 feet; depth of hold, 8 feet; depth of hold to spar deck, 15 feet 6 inches; draft of water at load line, 7 feet; area of immersed section at this draft, 160 square feet; displacement at load line, 438 tuns; tunnage of vessel, $353\frac{45}{100}$ tuns.

Her frame is of wrought bar iron, 3 inches by $\frac{3}{4}$ of an inch in thickness, and is fastened with keepers $2\frac{1}{2}$ inches by $\frac{5}{8}$ of an inch every 12 inches; the rivets used are $\frac{5}{8}$ of an inch in diameter. The frames are molded 3 inches, sided $\frac{3}{4}$ of an inch, and are 16 inches apart from centers. Number of strakes of plate from keel to gunwale, 9; thickness of plates, $\frac{5}{8}$ and $\frac{15}{16}$ of an inch. There are 8 cross floors; shape of same, T; depth of these, 14 inches; thickness, $\frac{5}{8}$ of an inch, forming belts with angle iron on top, and all continuing up to the clamp at gunwale. Shape of keel, U; dimensions of same, 4 inches in depth, and $\frac{7}{16}$ of an inch in thickness. There are 8 fore-and-aft keelsons, 13 inches in hight and $\frac{5}{8}$ of an inch in thickness; shaped, T.

The *Louisiana* is fitted with one inverted direct acting condensing engine; one cylinder, its diameter being 32 inches; length of stroke of piston, 2 feet 4 inches; length of engine and boiler room, 35 feet; diameter of propeller, 8 feet 2 inches; pitch of same, 15 feet; width of blades, 4 feet 3 inches; number, 4; material, cast iron.

She is also supplied with one return flue boiler, whose length is 18 feet; breadth, 7 feet 9 inches; hight, 7 feet 3 inches; located in hold, forward of engine; it has no water bottom. Number of furnaces, 2; breadth of these, 3 feet 4 inches; length of grate bars, 5 feet; number of flues above, 16; number of flues below, 10; internal diameter of flues above, 6½ inches; internal diameter of those below, 2 of 1 foot 4 inches, and 8 of 8½ inches. Diameter of smoke pipe, 36 inches; hight, above grates, 33 feet. The boiler possesses a grate surface equal to 34 square feet, and a heating surface of 843 square feet; consumption of coal per hour 560 pounds; maximum pressure of steam, 30 pounds; point of cutting off, one-half stroke; maximum revolutions at above pressure, 84; weight of engine, 43,334 pounds; weight of boiler with water, 38,760 pounds.

The bunkers are of wood and iron; the vessel is fitted with three anchors, weighing, respectively, 1,250, 1,000 and 300 pounds; waterways are of wood; she has two bulkheads, iron braced with angle iron; does not use blowers to her furnaces; she has one independent steam fire and bilge pump, and beside this, two bilge pumps; there is also one bilge injection for large engine and four bottom valves or cocks, viz.:—two for injection, one for steam pump and one for deck pump.

Protection from fire has been well attended to in the shape of iron, tin, felting and zinc being used around the boiler, decks, beams, chimney room, &c. The vessel has three masts, and is schooner rigged.

Hints About Rats.—A correspondent of the *Gardeners' Monthly* says:—I tried the effect of introducing into the entrance of their holes, runs or hiding places small portions of chloride of lime or bleaching powder, wrapped in calico, and stuffed into the entrance holes, and thrown loose by spoonfuls into the drain from the house. This drove the rats away for a twelvemonth; when they returned to it they were treated in the same manner, with like effect. The cure was most complete. I presume it was the chlorine gas which did not agree with their olfactories.

The trap boulders in the Central Park are the same sort of rock as that which forms the Palisades across the Hudson, and they were doubtless broken off from those ledges and transported to their present position by geological disturbances long ago.

ELECTRICITY AND SOME OF ITS PRACTICAL APPLICATIONS.

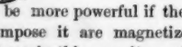
ARTICLE VII.

The last electric machine described, though powerful for its size upon a small scale, is not so efficient when a powerful current is required as one of more recent invention, in which several permanent magnets are used. As this machine is destined to play an important part in the production of the electric light, we shall be minute in our description of it. It consists of a strong circular frame, upon which are fixed several hollow coils of insulated wire, each having within it a bar of soft iron, and these are so arranged that they shall be in the direction of radii to the circular frame, and that their inner ends shall be in a circle concentric with the frame. Inside of the frame, and also concentric with it, revolves a wheel which has bolted upon its rim a number of powerful magnets, which are fixed in the direction of radii, and thus will, in each revolution of the wheel, come successively into such a position with regard to the bar in each coil, that it and the magnet before it shall be in the same line, and, as a consequence, the bar will become transiently magnetic, and a current induced in its coil; and as this induction takes place in each coil as many times during every revolution as there are magnets upon the wheel, it will be seen that the number of momentary currents excited is very great. In order, however, to render these currents available, they must be concentrated upon two single conductors. In doing this, great care must be observed in several particulars. It is almost impossible to give any adequate description of so complicated a principle as is involved in the operation of the induction; but we will state a few facts in connection with the direction pursued by the currents.

All of the magnets must be fastened upon the wheel, with the same pole outward—it is immaterial which. Now, it is obvious that each magnet will have the same effect upon each of the soft iron bars, and, as a consequence, all of the induced currents must flow in the same direction around their bars of soft iron. This being the case, it is obvious that every coil must be wound in exactly the same direction, and that half of the end of the coil wire must be so connected together that a current passed through the whole apparatus would traverse the same path in each of the coils; if a current will take a certain path or route in passing through each coil, it will take the same path in passing out from within. Half of all the wires proceeding from one end of the coil, and those proceeding from the other, must then be respectively joined in one wire, having a sectional area equal to the sum of that of all the wires which are connected with it. The two large terminal wires correspond to the positive and negative wires of the battery, and the extremities of these wires may be attached directly to the electrodes of carbon and their controlling apparatus. As the current produced by this machine is like that produced by the battery, any apparatus for controlling the motion of the electrodes, if successful when used with the battery, will also be successful with the above described machine.

The magnets used in this machine must be very powerful, and are best made from several thin plates of steel fastened together and magnetized. The cut

Fig. 11



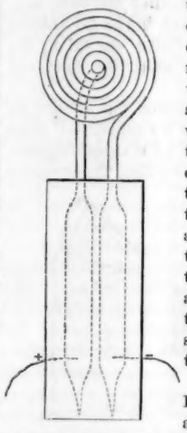
represents such an arrangement, which is called a "compound magnet." It will be more powerful if the smaller magnets which compose it are magnetized before being fastened together; in this case, it would be necessary to fasten them by means of screws or bolts. The wire used for the induction coils should vary slighly in size, according to the size of the magnets used, and their power; as this last quality is somewhat variable, it is best to take the average power of the magnets used, and ascertain the best size. Of the advantages of the electric light over other artificial means of illumination where an intense light is required to occupy a small space, nothing farther need be said; but it is to be hoped that the subject will receive more attention from American inventors than it has heretofore.

[Concluded.]

THE oyster dealers of Fairhaven, Conn., put up, annually, 251,450 tin cans, and 446,832 wooden kegs of oysters. They sell 1,000,000 bushels in the shell, and 1,000,000 gallons opened, every year.

Electrical Illumination.

The following is an illustrated description recently communicated to the Royal Society, London, by J. P. Gassiot, F.R.S. It relates to the application of electrical discharges from the induction coil, for the purposes of illumination. The figure represents a carbonic acid vacuum tube of about $\frac{1}{16}$ of an inch internal diameter, wound in the form of a flattened spiral. The wider ends of the tube, in which the platinum wires are sealed, are two inches in length, and about half an inch in diameter, and are shown by the dotted lines; they are inclosed in a wooden case (indicated by the surrounding entire line), so as to permit only the spiral to be exposed.



When the discharge from a Ruhmkorff's induction apparatus is passed through the vacuum tube, the spiral becomes intensely luminous, exhibiting a brilliant white light. Mr. Gassiot, who exhibited the experiment at the meeting of the society, caused the discharge from the induction coil to pass through two miles of copper wire; with the same coil excited so as to give a spark through air of one inch in length, he ascertained that the luminosity in the spiral was not reduced when the discharge passed through fourteen miles of No. 32 copper wire.

TOWERS' PATENT BROOM.

The very best class of inventions out of which to make money are those that embrace improvements in articles of constant use in every household. It would take but the profit of a single cent on every broom sold in the United States to make a large fortune for the patentee during the fourteen years' existence of his patent. The object of the improvement which we here illustrate, invented by William H. Towers, of this city, is to prevent the broom from becoming bent or broken down by use, to construct a broom which shall be stiffer and more elastic than those heretofore in use, and which shall preserve its straight and fan-like form

Fig. 1

Fig. 2

through long and severe usage. This is accomplished by mingling splints of cane or rattan with the broom corn in the formation of the broom. The position of the cane splints in relation to the broom corn is clearly shown in Fig. 2, which represents a cross section of the broom. A quantity of splints, *a*, occupies the center of the broom; these are surrounded by a layer of broom corn, *b*, which in its turn is enclosed by a second circle, *c*, of splints, and finally the broom is finished upon the outside by a layer, *d*, of broom corn. This construction does not alter the appearance of the brooms from those now in use, while it secures perfectly the several qualities which were the object of the invention.

For heavy sweeping, like that of shops, sidewalks, &c., our experience proves it to be particularly advantageous. The patent for this invention was granted Sept. 4, 1860, and further information in relation to it may be obtained by addressing the manufacturer, D. M. Smith, at No. 99 Maiden-lane, New York.

Extracting Silver from its Ores.

A new process, originally suggested by Dr. Percy, F.R.S., of the British government School of Mines, has lately been carried out upon a large scale by Herr Von Patera, one of the most celebrated metallurgical chemists of Austria. This process is analagous to the fixing operation in photography, in which the chloride of silver not acted on by light is removed by alkaline sulphites.

The ores which contain the silver, in combination with sulphur or with sulphur and arsenic, are first roasted with copperas and common salt, and by this means a chloride of silver is produced which may be dissolved out with a solution of hyposulphite. The silver is then precipitated by sulphide of sodium, and falls down as sulphide of silver. All that is necessary to be done then is to heat the sulphide in a muffle exposed to the air, when the sulphur escapes in the form of sulphurous acid and the silver remains in the metallic state; it is then melted in plumbago crucibles, and cast into ingots ready for minting. The ores which have been subjected to this process, as stated in the *Society of Arts Journal*, contain from two to ten per cent of silver; the hyposulphite is used weak and cold; its dissolving power is great. This solution may be used over and over again, as it is continually renewed, and this is a peculiarity in the process. The preciptation of the silver from the hyposulphite is by the sulphide, or rather a polysulphide, which is prepared by calcining soda with sulphur, then boiling it with sulphur. In this manner a polysulphide of sodium is formed, which, when it is brought into into contact with the atmosphere, some hyposulphite is generated, so that, when it is used to precipitate the silver, it also refreshes the bath of hyposulphite and be used re-repeatedly for the same purpose. By this process Herr Von Patera extracts 3,000 lbs. of silver per annum from ores at Joachimsthal, in Bohemia. The expense of extracting a pound of silver from the ore by this method is $2.07; by the old method of smelting it cost $3.52.

PATENTS IN THE SOUTHERN STATES.—Apprehension has been expressed by many inventors and patentees that, in consequence of the progress of secession in Southern States, their rights in those States would not be recognized. We have just received a letter from an influential source in Georgia, from which we make the following extract:—"Arrangements have been made with our Senators, so that when they meet in Montgomery to form a Southern Confederacy, all the existing patent laws of the United States will be endorsed." The Alabama Convention has also passed an ordinance adopting, as the law of that State, the laws of the United States relative to patents. These are strong indications that the rights of patentees will be fully respected in all the Southern States. The Baltimore journals confirm the assertion made by us two weeks ago respecting the safety of the Federal city from attack. We are confident that no apprehension need be feared that intercourse with the Patent Office will be obstructed.

THE ARTESIAN WELL AT COLUMBUS, OHIO.—This well, having reached a depth of 2,775$\frac{4}{10}$ feet and no water being obtained, the work on it has been suspended. A current of water was struck at 150 feet, sulphur water at 180, and salt water at 675 feet; but none of this water rose to the surface. Dr. Newberry, who has made a geological examination of the materials brought up by the borings, gives a discouraging report in regard to the prospect of finding water by a continuation of the work. The temperature of the well at 2,475 feet was found to be 88° Fah., showing an increase of temperature of one degree for every 71 feet.

CARHART'S MELODEON PATENT.—In answer to numerous inquiries in reference to this patent, we would state that it was duly extended by the Commissioner of Patents for seven years from December, 1860. By some oversight, on the part of the Patent office, the extension of the patent was not reported at the time the petition was granted.

ROMANCE OF THE STEAM ENGINE.

ARTICLE X.

NEWCOMEN AND CAWLEY.

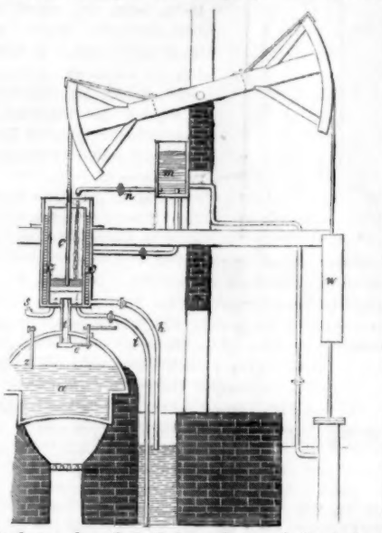
We have now passed over the rudimentary history of the steam engine—those stages of its progress when much ingenuity was expended in producing impracticable engines, so far as relates to economy in working. Several of the engines described were actually operated for a brief period, but they did not satisfactorily stand the test of a long continued working. But now that we have come to the more practical, it will be found none the less romantic historical, period of the steam engine. Savery's engine was no doubt superior to animals for raising water, because its power was capable of being increased and concentrated far beyond what animal power could be attempted in the execution of such objects. But owing to the very high pressure of steam required for its operation, it was constantly getting out of order; this was due, also, in the greatest measure, to the inaccurate construction of its several parts, as mechanical skill was then quite low, and the tools employed by machinists were exceedingly rude. Savery's steam boilers also were dangerous, because the plates were riveted together in a very inferior manner. The engine was defective in another principle, and that the most serious one; it could not draw water from a greater depth than thirty feet; therefore it was necessary to place it low down in a mine, to force the water upward. Attention was also necessary to open and close a number of cocks by hand, so that it was very far from being a self-acting steam engine.

Heretofore all the steam engine inventors that we have described were above the common working, mechanical classes; they were either professors, princes, doctors, captains, or men of wealth and leisure without any profession. Coming to the men of bone and sinew, we shall find that they possessed, in no inferior degree, the intellect for invention. The accompanying figure represents the steam engine of Thomas Newcomen and John Cawley, residing in Dartmouth, England, in 1717. This figure represents the first grand and decided approach to the condensing steam engine of the present day; *a* is the steam boiler; *c* is the cylinder, placed in close proximity to it; it is double, having a waterspace, *x*, around it. The piston rod is connected with a chain united to a walking beam. A common weighted lifting pump is shown operated at the other end of the walking beam. This was an atmospheric engine—single-acting. The steam was admitted into the cylinder, *c*, under the piston, through pipe, *t*, by turning the cock, *e*; when the piston was raised to the top of the cylinder—its full stroke—the steam was shut off by hand, by turning the cock, *e*, and at that instant water was admitted from tank, *m*, into the chamber, *x*, surrounding the cylinder, by turning the cock, *n*. The cold water outside condensed the steam below the piston and formed a vacuum under it; the piston then made the down stroke by the pressure of the atmosphere (15 lbs. on the square inch) on the surface of the piston. When the down stroke was completed, the water from the tank, *m*, was shut off, and the water in the condenser, *x*, allowed to flow out by the pipe, *h*, and also the condensed water in the cylinder by pipe, *i*. The latter pipe passed down to a depth of 32 feet, so as to permit the formation of a perfect vacuum under the piston. *z* is a gage cock in the boiler; a small quantity of water was permitted to flow upon the upper face of the piston to make it steam-tight, as the mode of packing was then very defective. As a portion of rarefied air is always set free in condensing steam, the pipe, *f*, was provided to permit its escape from the cylinder, so as to obtain a perfect manner. A weight, *w*, was connected with the pump end of the beam, and was elevated by the descent of the piston, then descended by its gravity. This was the parent of the famous Cornish pumping engine. Steam of atmospheric pressure was employed.

The owners of mines soon appreciated the merits of this engine; they saw that it was a practical pumping engine, capable of being placed at the mouth of a mine, and of lifting water from any depth. It had its defects; it was not self-acting, as its water and steam cocks had all to be operated by hand at every stroke, and it was very slow in its operation, besides a great deal of heat being wasted because the cylinder had to be heated from 100° Fah. to 212° Fah., at every stroke before the steam commenced to raise the piston.

Newcomen and Cawley secured a patent, but Savery claimed the invention of producing a speedy vacuum by condensing steam with water, and rather than contest the right they admitted him to be associated with them in their patent, but he did nothing to improve the engine. The boiler was fed by the water from the cistern into which the condensed water was conducted.

In this engine, the condensation was effected by water applied to the surface of the cylinder—it was a surface condenser. An accident led to a great improvement in condensing the steam rapidly. The inventors



noticed, one day, that their engine made its strokes far more rapidly than it had ever done before, and being surprised at this phenomenon, they overhauled its parts, and found a small leak in the piston, through which a jet of water was forced among the steam. This led to the invention of the inside or direct condenser by which a shower of water was injected, by a tube, from the pipe, *m*, through the bottom of the cylinder, direct among the steam when the up stroke was completed, for the purpose of rapid condensation; this was a fortunate discovery.

To Newcomen and Cawley, two practical English mechanics (the former a blacksmith, and the latter a glazier), we are chiefly indebted for the first truly practical steam engine. All the subsequent improvements which have been made in the steam engine were mere attachments to it. We have not been able to ascertain how Newcomen and Cawley were led to the invention of this engine, nor how they were rewarded for their improvements, but we know that their merits have not been duly recognized or appreciated by historians. Their names deserve to be handed down to distant generations as the fathers of the condensing steam engine of the present day, as we shall hereafter show that the resplendent improvement of the great Watt was actually made upon this engine of Thomas Newcomen and John Cawley.

The "Engineer"—Personal.

This interesting mechanical paper, which was lately started in Philadelphia by Mr. Zerah Colburn, has been discontinued. The stoppage was brought about by the financial troubles of the country. Mr. Colburn has gone to England, and will doubtless find there a wide and, we hope, lucrative field for his acknowledged talent.

We find the above announcement in the *American Railway Times*, and we most heartily join in the good wishes expressed for Mr. Colburn on his return to England. For some reason Mr. Colburn has had wretched success in conducting mechanical journals in this country. He has a certain order of talent, but evidently not adapted to the popular notions of our people. Somehow, in spite of all his professions of uncommon knowledge, he failed of appreciation here and has now gone back to England, where he was at one time connected with the London *Engineer*. One of the chief elements of his stock in trade, while conducting the *Engineer*, consisted in abusive attacks upon the SCIENTIFIC AMERICAN, which he will no doubt renew whenever opportunity presents. It will be impossible for Mr. Colburn to repose upon a bed of roses without being irritated by an occasional thorn.

Our Correspondence.

Geology—The Rochester Cabinet.

MESSRS. EDITORS:—Allow me, through your columns, to call the attention of the Scientific world to a rare Museum of Nature which has just come to light. A few days since, while passing through our beautiful city on the Genesee, my attention was called to a magnificent collection of minerals and fossils recently spread out in one of the largest Halls in the city. It is the possession of Mr. Henry A. Ward—a young and ardent naturalist of the school of Hugh Miller—who, during six years of travel in both hemispheres, has been collecting, with the special end in view of illustrating the entire field of geology and mineralogy. I have myself visited almost every important cabinet in the United States and Europe; and I unhesitatingly say that this is one of the richest and most complete in the world. All the specimens are choice—many of them exceedingly rare and unique; while the fossils are in a state of high preservation. But the prominent feature is the *completeness* with which it represents, both in order and character, the course of creation. Each specimen is a letter in the Book of Nature—unfolding the great idea of God as it marched on to realization. To the theologian, philosopher, and student, this cabinet is a vast repository of thoughts and suggestions to which the Astor Library is nothing. As your journal is pledged for *Science* as well as *Art*, I propose to give you—not a catalogue, for that were impossible—but something like "a running commentary" on this valuable compend of the world's history. It may serve as a guide for any of your readers who may be so fortunate as to visit this unrivaled gallery.

The geological department begins with a very extensive series of rocks arranged in several sections: the first includes some 1,500 specimens so grouped as to show all the lithological varieties and species. The rest represent the mining district of Saxony, the Plutonic region of the Alps, the volcanic products of central France, Teneriffe, and Giant's Causeway, the metamorphic strata of Tuscany (with a beautiful collection of Italian marbles), and a large suite illustrating the geology of the Paris basin. From this introduction, we pass to the fossils, which number about 8,000 specimens, and all arranged so as to illustrate the animal and vegetable life of each successive age. Here are the "palæozoic plants, secondary reptiles, and tertiary mammals" of the cromarty genius in wild profusion; floral fragments speak of giant forests which now lie wrapt in the dead and stony sleep of eons; enormous jaws bristling with teeth, and thigh bones a foot in diameter, jut out from rocky slabs and point back over millenniums of centuries to the time when "gorgons, hydras, and chimeras dire" were lords of creation. We are ushered first into the presence of the antiquely-fashioned fauna of the silurian—a world of molluscs, corals and crustacea. Save now and then a placoid fish, all are invertebrate: corals and corallines—the fancy architecture of little polyps, the earliest of created beings, crenoids, trilobites (80 varieties), and long orthoceratites without number. How strange the aspect earth must have presented in this misty twilight of creation! It was a struggle of light and life over "chaos and old night." For cycles granite was the only rock; though reefs were rising to the water's edge through the ceaseless labors of those Adamites of the animal kingdom; beautiful stoneflowers blossomed on the bottom of the ocean; lazy worms crawled on the mud of newly-made shores; myriads of armor-clad trilobites, with their hundred eyes, floated on their backs; and savage cephalopods shot like arrows through the vasty deep. Stepping across this dark millennium, we find ourselves on the old red sandstone of Hugh Miller, alongside of his favorite holoptychius, cephalaspis and pterichthys. It was the period when ganoidal fishes were thrown into the world with amazing prodigality: so here we have the fins and teeth, scales and skeletons of awkward finny tribes—buckler-headed, winged and reptilian—then the highest type of living creatures. Another stride, as if into a coal-pit, and we are in the dingy carboniferous era. We are surrounded with the unmistakable relics of the rank, flowerless vegetation which flourished under the warm, steaming atmosphere of the third day of creation. Never before nor since did our planet bear such splendid flora. In walking among their ruins, the visitor feels as if he had been set down amid the giant and elaborate columns of Baalbec. Dry land had ap-

peared when these lofty trees stood bolt upright and waved their luxuriant branches in the passing breeze; but it was in the shape of islands, and death-like silence hung over the deep tangled forest: not the hum of an insect nor a footfall was heard around the globe.

Passing another boundary, we enter a new world—the realm of strange, misproportioned sea monsters and creeping things—"creatures whose very type is lost, fantastic and uncouth." The cabinet is very rich in trias and lias fauna. Here, on a slab 7 feet long, are the original tracks of the gigantic labyrinthodon—half crocodile, half frog; and close by, its head armed with 400 teeth. There are the relics of an ichthyosaurus—a reptilian whale mounted on paddles—whose entire length, judging from the head (over 5 feet long), vertebræ and paddles, must have been 60 feet. There, too, with a multitude of coprolites, is a family of five on unbroken slabs. Next neighbors are the head (5 feet long), and the paddles (7 feet long), of the ugly plesiosaurus, whose neck resembled a boa-constrictor. Still more prominent and intensely interesting are the three-toed footprints from the banks of the Connecticut which tell us of a time when gigantic birds stalked over New England—a match for the rocs of Sinbad the Sailor. In this section, also, are 400 or 500 species of ammonites, with an allied group of nautilites with their whorled shells; many of them, being sawn open and polished, show the curious siphuncle within, and without a surface resembling festoons of foliage and elegant embroidery. Alongside is a full regiment of belemnites with ink bags for artillery; and stone lilies of enormous size grow out of solid rocks, with skeletons made up (by calculation) of 30,000 separate pieces. How forbidding is even a fancy sketch of that great reptilian period. Imagine a black, slimy plesiosaurus, 20 feet long, half walking, half creeping up on one side; and, on the other, a huge labyrinthodon making elephantine tracks toward you! Monster birds cast their long shadows over the new red sandstone; while ichthyosaurs, with eyes glaring like globes of fire set in a crocodilian head, and paddles like the arms of a windmill, prowl through the wide waste of waters, sole monarchs of the main! Of all this scene of horror, nothing now remains but "footprints on the sands of time." Traveling on, we come to the oolitic series—the burial place of other races, who, in their turn, were the fierce lords of this lower world. There is not a freak of the most distorted imagination which is not surpassed by the "fearfully great lizards" of this era. Here are the horns and scales of the massive iguanodon, a strange animal longer and taller than the largest elephant, having an alligator's snout, a tail 13 feet long, and altogether lifted upon legs that would well compare with the trunks of California trees. When it moved, whole forests were trodden down. Here, too, we find fragments and casts of those gigantic, carniverous, cold-blooded reptiles, the megalosaur and Teleasaur; and yonder upon the wall, but stuck fast in the rock, is a flying dragon, called pterodactyl, with the head of a crocodile, the wings of a bat, the body of a mammal, five toes, and a tail.

From the oolitic we step to the cretaceous fossils. Here we have a magnificent group of fishes, sharks' teeth, crioceralites, sponges, echinoderms, infusoria, &c., &c. But head over all, in this department, is the new lizard of the Rhine—the mosasaurus, of which Mr. Ward has the only cast in America, and the seventh in the world. Hugh Miller, in his "Cruise of the Betsey," has a pleasant story about the original specimen. Next is the eocene division, which represents the time when the earth began to wear its present landscape. We find here the teeth of the harmless polæotherium and anoplotherium from the Paris basin, teeth and head of the royal zenglodon, fishes from Monte Bolca, turtles from the Isle of Sheppey, "Pharoah's beans" by the box, oysters and crabs in unending variety, and 100 foraminifera—the animalcules who created the building stone of Paris. Everything indicates an advance toward the higher types of animal existence—the dawning of the sixth day of creation. Quadrupeds took the place of reptiles, the latter having been degraded to a petty snake for the residence of the fallen spirit. And now the curtain rises upon the last millennium of God's handiwork. Monster mammals and ruminant animals began to haunt the forests and prairies of *terra firma*. Just as submarine volcanoes were casting up the picturesque basaltic columns of Oregon and Ireland, the dinotherium—the bulkiest of "four footed beasts"—commenced reigning over the northern hemisphere. It was a hippopotamus-shaped animal, having tusks curving down from the lower jaw like a pickaxe, and legs ten feet high. It is represented in this cabinet by a skull 4 feet through. Alongside is a skull of the primeval sloth—the colossal megatherium, whose thigh bone measures 4 feet in circumference; teeth, tusk, and jaw of the mammoth; skull and teeth of the mastodon; jaws and teeth of the hippopotamus, rhinoceros and boar; head and jaws of the cavern bear; jaws of the hyena, horse and deer; claws of the megalonyx; whale's ear bone; osseous breccia from the cavern dens of Carnivora; and eggs of extinct epyornis from Madagascar, capable of holding 50,000 humming birds' eggs. Such are some of the prominent objects and thoughts which arrest the visitor in a rapid trip through this wonderful museum.

Leaving this city of the dead, we cast our eyes over the beautiful collection in the mineralogical department. It is idle to attempt to give here even a synopsis of its contents; and a catalogue would usurp your paper. The best idea of it is gained by remembering that it is one of the most complete in the United States. I cannot, however, forbear mentioning a few of the most remarkable specimens which attracted my attention. The cabinet begins with an introductory part (numbering 1,200 specimens), containing, 1st, a full suite of crystals, revolving, dissecting, &c.; and 2d, many series of minerals illustrating structure, aggregation, fracture, color, diaphaneity, electricity, imitative forms, natural associations, and the like. Next follows a systematic collection of three-fourths of all the species recognized in all the latest works on the science, American and transatlantic. Here are splendid ores fully representing the mines of Hungary, Saxony and Cornwall; crystals of gold from Australia; and a fac-simile of the "Welcome Nugget" which weighed 2,160 oz.; carbonates of copper from Siberia and France; ores of mercury from Austria and South America; manganese from the Hartz; precious stones handsomely represented by agates, jaspers, beryls, onyx, emeralds, tourmalines, topaz, and by perfect imitations, in Bohemian glass, of all the noted diamonds in the world; opals and semi-opals from Hungary; Labrador feldspar; a splendid mirror of obsidian—a foot in diameter; fine carbonates of lime from Andreas Berg; zeolites from Ireland, Scotland, Bohemia and Nova Scotia; beautiful fibrous gypsum; meerschaum from Turkey; splendid arragonite from Vienna; quartz from Madagascar penetrated by long crystals of rutile; geodes; meteorites; fulgurites; every variety of coal from peat to anthracite; polished septaria—the mosaics of nature; 24 varieties of infusorial earths from different localities, &c. When we consider that these departments contain 25,000 picked specimens, we readily and rightly infer that all the forms of each individual mineral and fossil are illustrated as we seldom find them in the best of collegiate and imperial museums. Beside these natural products, there are casts from the Garden of Plants of Cuvier's great types of the animal kingdom; and a multitude of mounted charts, diagrams and reliefs.

I present your readers, and the lovers of true science generally, with this meager sketch of the richest cabinet in America. I do it to apprise them of its reality and its unknown value, and with the hope that they will take the earliest opportunity to pay it a visit. A treasure house of nature, so fully developed and finely arranged, is certainly an honor to any city or State; and I earnestly hope that it will not be suffered to go out of the country. JAMES ORTON.

Telegraphing and Submarine Cables—Gutta-percha as an Insulator.

MESSRS. EDITORS:—On page 20 of the present volume of the SCIENTIFIC AMERICAN, I noticed a communication headed "Electricity and some of its Practical Applications, article II.," in which reference is made to the "science of telegraphy," and as it contains some expressions not in accordance with my views, I desire permission to make a few important counter statements.

In the assertion that "the science of telegraphy, as far as it relates to inland lines and their working, has attained but a degree of perfection" I fully concur, the inland lines being all rendered inoperative in long circuits during heavy rains and fogs, as the escape of electricity from the wire or conductor to the earth is greatly facilitated by the exposed metallic surface of each wire to the atmosphere. Take, for example, the New York and Washington lines, of which each through wire exposes a surface of not less than 45,000 square feet, and between several surfaces or wires of that extent, there can be little doubt that a large quantity of the electric force must be transferred or conveyed to the earth and lost when the air is charged with moisture.

Practical telegraph operators vouch for this fact, and therefore, in the construction of telegraphic lines, the greatest possible care and attention should be given to the proper insulation of the wires, not only at the poles, but through their entire length, as it is impossible to insulate too well a line of wires exposed to the atmosphere and to the abraiding forces distributed along a line of telegraph. The writer of the article referred to says—

But the art of successfully operating the submarine telegraph—especially where it occurs in long lines—is, as yet, in its infancy. This was made plainly evident by the failure of the Atlantic cable; and if American inventors do not deserve any of the discredit of its failure, they have not, as yet, brought forward a better cable.

The remarks contained in the foregoing extract are at variance with facts which have transpired within the last 18 months, as will be shown by an extract from a certificate signed by Professors Henry and Bache, and Captain M. F. Maury, of the United States Observatory. Speaking of the peculiarity of Rogers' cable for the deep sea, they say it "consists in putting on the outer covering in the form of a plaiting similar to that with which whip stocks are covered. This method of covering is superior to that employed by the Atlantic Telegraph Company, inasmuch as it does not untwist or tend to produce kinks, and better protects the gutta-percha."

In the manufacture of these deep-sea cables, it is proposed to use a No. 9 or No. 10 steel wire for the core or conductor, so as to gain strength, as the recent experiments made at the Navy Yard, Washington, for the Atlantic Telegraph Committee, proves that the strain caused by submerging the cable first applies to the core or conductor of the telegraphic cord or cable, before it is taken up by the outer covering or spirally laid wires, as the following extract from the report will prove:—

United States Navy Yard, Washington,
Blacksmiths' Department, Dec. 8, 1859.

Commodore Franklin Buchanan, Commandant.

Sir:—In compliance with your order of the 3d inst., I have afforded Mr. Henry J. Rogers the necessary facilities for testing the strength of samples of his electric cord, and beg leave to submit the following statement of the result of the tests. . . . In all these tests it was found that the iron or steel core parted before the outer covering was fractured.

After breaking the core of the sample marked K (steel wire, No. 10 gage), which, as stated above, parted at 1,910 lbs., the strength of the outer covering was tried, with 21½ lbs., in scale, or at a strain of 430 lbs., the net work of copper wire (which was plaited over the steel wire) and the outer braiding of twine parted, leaving the gutta-percha, which was finally broken at a strain of 260 lbs.

Very respectfully, your obedient servant,
(Signed) JAMES TUCKER,
Master Smith.

Possibly, to the want of knowledge of this fact by the English telegraphic engineers may be attributed one of the causes of the failure of the Atlantic cable. The strain in paying out their cable was first taken by the copper conductor, composed of a series of small copper wires; then by the gutta-percha insulation, which became thereby defective; and lastly, by the outside spirally laid wires, which were so strained while being payed from the ship as to force the tar out of the jute underlying the outer covering of wires. [*See Mullaly's History of the Laying of the Atlantic Telegraph Cable, page* 264.]

Under these circumstances can it be expected that any insulation would remain uninjured? Therefore your contributor, I hold, is not justified in condemning gutta-percha as an insulator, and the failure of the Atlantic cable must not be charged to the use of that material in its construction.

Elasticity of material is not a requisite for insulating telegraphic wires; pliability or flexibility, however, is, and gutta-percha possesses these in a high degree, and as the conductor—whether iron, steel or copper—has first to take the strain, the rupture of the gutta-percha does not occur until the parting of the entire cable, as proved by the experiments made at the Washington Navy Yard, in which the gutta-percha was really the last material to give out. These facts all prove that a telegraphic cable cannot be successfully laid in the deep sea unless it combines great strength in the core

with the use of light material in its construction, so that it may gradually sink or lightly find its way to the bottom of the sea.

The cable or telegraphic cord proposed by the undersigned for the deep sea need not weigh over 700 lbs. to the mile, with a conducting power double that of the Atlantic cable, and a capacity of resisting a strain of 2,000 lbs., the tenth part of which need not be applied while laying it, as it can be paid out by hand or by means of a reel—the simplest form of machinery.

For shoal water, however, I use lead covered cordage, which is far better than those served with iron wire, from the fact that it does not oxydize in sea water; besides, its conducting power is below that of iron.

As to the statement that gutta-percha softens and melts at a heat considerably below that of boiling water, I have to say that a simple remedy can be applied to obviate this, by means of plaiting a covering of hemp cordage over the gutta-percha, thereby forming a pliant and secure protection against heat and abrasion from mechanical and other forces. This mode of covering telegraphic wires has been applied by the undersigned for several years, and so effective has it proved against the action of heat, that the gutta-percha insulation retains its form at a temperature far above that of boiling water. Without this protection, however, it is well known that gutta-percha is not affected by ordinary heat so as to impair its insulating property for telegraphic lines.

The successful and constant working of the Dover and Calais cable, laid in 1850, and the hundreds of miles of submarine wires laid and working in rivers, lakes and seas, in different parts of the United States and Europe, proves to my mind that gutta-perch is the only suitable material now known, and that can be relied on, for insulating submarine telegraphic lines, if properly prepared and applied by the manufacturer.

HENRY J. ROGERS,
Electric Telegraph Engineer.

New York, Jan. 29, 1861.

Superheated Steam.

MESSRS. EDITORS:—My limited experience in superheated steam has been sufficient to convince me of its importance. It appears that, in order to utilize the maximum effect of steam, or at least the maximum quantity of expansion, it is not necessary to overheat it after pure steam is formed, that is, when all the small particles of water in the steam are evaporated. When the steam passes through the superheating apparatus, its temperature is greatly increased, while the pressure remains the same. If steam, with particles of water in it, is admitted into a cylinder during a part of the stroke, and then allowed to expand, it is generally found that the pressure at the end of the stroke does not come up to that due by theory, from which it is pronounced that the expansive quality of steam does not follow that of a perfect gas; but if we knew the cubic content of all the particles of water, and subtracted that from the cubic content of the steam, omitting condensation which may take place, I am inclined to believe that we would find its expansive quality not so far from that of a perfect gas. I am also inclined to believe that the expansive quality is diminished by overheating pure steam. The small particles of water in steam contain a great deal more caloric per volume than the surrounding steam, consequently, when admitted into the condenser, a good vacuum cannot be formed so quickly as with pure steam. It is therefore of great importance to pay particular attention to the superheating of steam, otherwise economy of expansion will not be realized to the extent given by theory. JOHN W. NYSTROM.

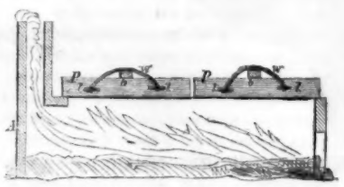
Philadelphia, Pa., Jan. 26, 1861.

Making Maple Sugar in Sheet Iron Pans.

MESSRS. EDITORS:—I promised in a former letter to your journal (published on page 378, Vol. III.) to give a description of the manner of setting the pans, arches, &c. The arches are built long and wide enough to take two pans, setting one on each end; the bottom of the arch is six inches higher at the back end than at the front, to give chimney draft as high as necessary, say from six to ten feet. The most durable and cheapest built arches are made by digging a trench of sufficient width and about one foot deep at the front end, and fill that with small poles and brush to a proper hight—about eighteen inches above the level of the ground—and then build the sides and back end of the arch up with stiff clay mortar, pounding it down solid with a maul, making the sides about eight or twelve inches thick and from eighteen to twenty inches high, and level on the top, which must be wide enough to let the pans rest on about two or three inches; the chimney is made of anything convenient. Such arches last better than any other when well protected from the weather. Four such pans, so set, with one other in the same style, set in the same way, to sugar off in, will boil the sap from 1,000 trees.

Another and cheaper way to make pans is to take a sheet of iron ten or twelve feet long, as wide as can be got, and two pieces of plank one foot shorter than the iron, and cut them square at each end; plane them on the inner side, and nail the edges of the iron to one edge of each piece or side six inches wide; then turn the ends up, and nail a cleat on the inside at the top at each end to nail the upper edge of the iron to. Sometimes we get the tinsmith to rivet two sheets together, making a bottom six feet long and four feet wide, and use the wooden sides; the sides do not burn away, and these pans last nearly as well as those made entirely of iron; they cost about half as much.

We sugar off 200 or 300 lbs. of sugar at a time in such a pan. It requires some practice to use a pan for sugaring off; but, with the handles to lift it by, it can be got off the fire before it burns. Our best sugar makers generally skim and settle their sirup to cleanse it, rather than use any of the cleansing substances; our premium sugar is all made in this way.



In the cut, *A* is the arch; P P, pans; *l l*, loops; *b b*, bars across the tops of the pans for handles; *w w*, wires passed through the loops and over the bars several times, to support the bottom and keep the bars in place. CARLOS BAKER.

Allegan, Mich., Feb. 2, 1861.

REPUBLIC OF SOUTH CAROLINA,
Jan. 16, 1861.

MESSRS. MUNN & CO.:—As I do not consider myself a citizen of the United States, I cannot take the oath required of me. If you can strike that out of the papers, and then let me sign them, I will do it; but if not, I withdraw my petition. Please answer immediately, as I expect to leave this place soon to go and defend my State. Allow me to thank you for the promptness with which you have always done my business. Yours, S. L. B.

We publish the above, from a resident of South Carolina, merely to show the state of public sentiment among some of her citizens. The writer is willing to sacrifice his legal right in an invention of value to him, rather than make the required oath of citizenship. We admire the spirit which induces a person to sacrifice his means in preference to principle. At the same time, we would advise all our Southern clients who consider themselves foreigners to the United States, and cannot conscientiously take the prescribed oath, to wait awhile, rather than abandon their claims to a patent by a withdrawal of their applications.

HORSES' FEET BALLING WITH SNOW.—Take a piece of paper and place it on the shoe as it is fixed on the horse's foot, with a pencil mark on the inside of the paper, the size of the inside form of the shoe; cut out the piece of paper, and mark the gutta-percha. Allow an eighth of an inch larger of gutta-percha on each side of the front part to go under the shoe, to keep it from coming out when the horse is at work. Taper the edge of the gutta-percha to facilitate it going under the shoe, and cut out a trianguiar piece of the gutta-percha so as to prevent an undue pressure on the frog. It will be found a simple, cheap and effectual remedy.—*The Field.*

THE Société Industrielle de Mullhouse recently offered a prize of £700 to any one who would utilize a cheap and efficient substitute for albumen, of which so large a quantity is used in calico printing. This substitute has been found by M. Hannon in the gluten of wheat flour, which is almost a waste product in he manufacture of starch.

Column of Varieties.

The great bulk of the tin and copper ores of the world are smelted or refined in England. This affords an immense trade to the shipping and coal mining interests of that country.

The celebrated railway tunnel of Mount Cenis, in the Alps, is suspended. It is not yet made known to the public, whether this is owing to the want of funds, or to the expected natural difficulties to its execution.

A coat of a composition, consisting of common lime mortar, mixed with hair and soapstone dust, is excellent as a non-conducting covering for steam boilers. It requires to be covered with boards on the outside, in the usual manner of jacketing cylinders.

From a statistical return lately published in Paris, it appears that 700 people are killed and 5,000 wounded annually by carriages and other vehicles in that city. The carriages of Paris kill and wound more people than all the railways in Europe.

The *Argus*, a French dispatch screw boat, lately built at St. Cloud, has her boilers so made that a jet of fire from the furnace is carried direct into the water by means of a worm flue. Several experiments have been made with it, but not with very great success.

The celebrated iron cased frigate *Warrior*, lately launched in London, is to be taken to Shoeburyness to be tested with Whitworth and Armstrong guns of the largest calibre, and under every possible circumstance to which she would be subjected in actual battle. If these trials prove successful with this vessel, the entire navy of England will be altered to meet the new conditions of naval warfare.

The London *Builder* says that a spider's web furnishes a better plan for the laying out of cities than any which has yet been devised by surveyors and engineers. Any one who can find a distinct web unbroken, will see how beautifully regular it is and how perfectly adapted for the quickest passage from any one point to another. The concentric rings are not circles but polygons, and the radiating exquisitely regular and straight.

Mr. Thomason, a very wealthy and extensive manufacturer of cotton goods at Bolton, England, has invited his working people to invest their savings of wages with him, and share in the profits arising out of his manufactories. This is a noble proposition.

The Lake Superior *Miner* states that a single mass of copper, weighing 13,000 lbs. (about six and a half tuns) was lately taken from the national mine. It is 1,200 lbs. heavier than any previous mass obtained for shipment.

New pumping beam engines, with appropriate machinery, are now being erected at New Orleans for the purpose of furnishing a greater supply of water to that city. The machinery was built at the New York Novelty Works, and U. E. Everett, the superintending engineer, is overseeing its arrangement in the Crescent city. The engines are designed to pump 12,500,000 gallons, to an elevation of 150 feet, in 24 hours.

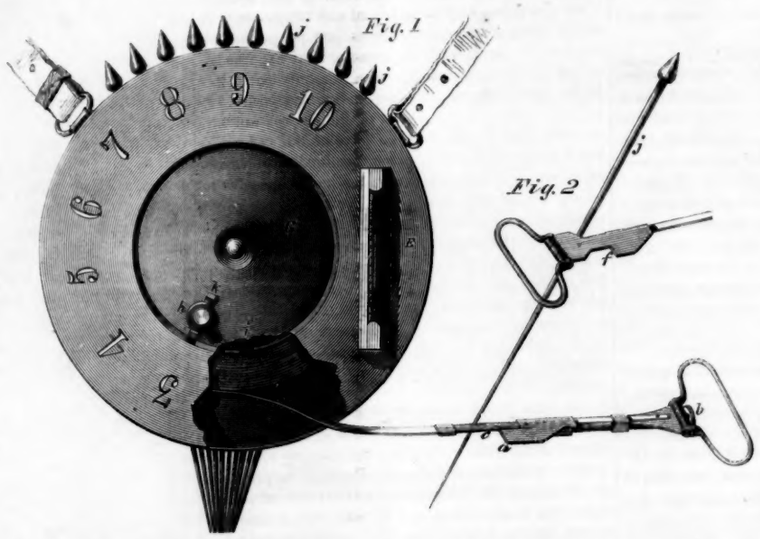
The present annual production of tobacco has been estimated by an English writer at 4,000,000,000 pounds! This is smoked, chewed and snuffed. Suppose it was all made into cigars, 100 to the pound, it would produce 400,000,000,000. Four hundred billions of cigars! Allowing this tobacco, unmanufactured, to cost on the average 10 cents a pound, and we have $400,000,000 expended every year in producing a noxious, deleterious weed. At least one and a half times as much more is required to manufacture it into a marketable form, and to dispose of it to the consumer.

The Philadelphia city railroad companies have adopted the system of selling tickets in packages of 25 for one dollar, four cents per trip. This is a reduction of 25 per cent in fares, and will be a great benefit to the public, and also to the railroad companies themselves, as every reduction in price increases the number of passengers.

The London *Court Journal* states that a great sensation has been caused among the principal jewellers, by the introduction of a "scented diamond." The stone has been recently discovered in Ava, and has the same value as others, the same transparency and brilliancy, and the same weight; but it possesses the most extraordinary quality of emitting a very agreeable odor under the influence of a high temperature—such, for instance, as is more frequently than agreeably felt in the ball-room.

Improved Surveyor's Measure and Tackle Case.

Surveying is performed by the measuring of lines and angles, and the instruments for both of these measures have engaged the attention of numerous and of highly cultivated minds. In the trigonometrical survey of Massachusetts, the base line was measured along the valley of the Connecticut by means of two rods, one held stationary while the other was carried forward and placed against its end; instruments being used to keep the rods level and in a straight line. The rod used for measuring lines in the coast survey was exhibited at the Crystal Palace in 1853. It was a long barrel with complicated arrangements, and looked as if it would require one pair of horses to transport it and another to operate it. There has been much discussion among engineers in regard to the comparative merits of the rod and chain, but we believe that, on the whole, the chain continues to be much used notwithstanding its acknowledged defects. The most prominent of these defects are: its wearing away at the joints of the numerous links, the difficulty or rather impossibility, on account of its weight, of straining it so that it will not sag, and the danger of stretching it, especially at the joints, by the strain employed to prevent the sag. In the measure here illustrated it would seem that the advantages of the chain are all obtained, while the most serious objections to that implement are all obviated.



PAINE'S IMPROVED SURVEYOR'S MEASURE AND TACKLE CASE.

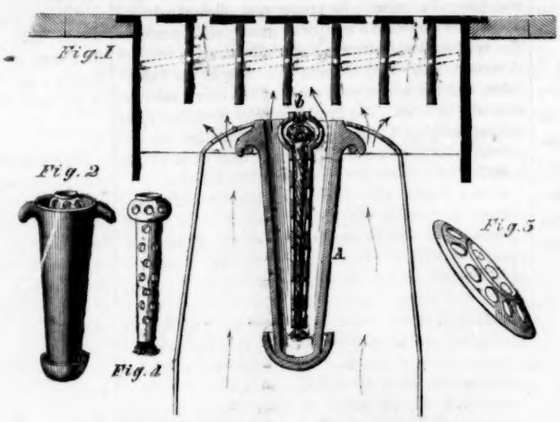
The apparatus embraces two distinct inventions, one consisting of a light, narrow steel tape, in combination with its removable and adjustable handles, and the other, of the case in which the tape is wound and carried. The measuring tape is of a low spring temper, and is covered with a coating of tin to protect it from rust; it is graded and marked in chain and links, or otherwise, as desired. The handles are removable, and are fastened to the ends of the chain in the manner clearly shown in Fig. 1, in the cut. The end of the tape is slipped under the clasps of the handle, when a small hole near its end slips over a short pin fixed rigidly to the handle; the spring of the tape holding it down upon the pin.

As the length of the tape is varied by the changes of temperature, an arrangement is made for adjusting the measuring part of the tape to compensate for the expansions and contractions. The shoulder, *a*, on one of the handles is formed upon a movable piece of metal which is caused to slide back and forth along the graduated scale, *c*, by turning the tangent screw, *b*. By careful measurement of the tape at the manufactory, at different temperatures, the point indicating the desired length of measure is ascertained and marked on the scale, *c*, with the corresponding degree of temperature. Then, at any time when it is desired to use the measure, by observing the temperature of the atmosphere as indicated by the thermometer, E, attached to the tape case, and adjusting the shoulder, *a*, to the corresponding figure marked upon the scale, *c*, a measure of uniform length is preserved, notwithstanding the expansions and contractions of the metal resulting from the varying temperature of the season or the day.

The handle, Fig. 2, at the opposite end of the tape, has its shoulder, *f*, formed to come against the same side of the pin as shoulder, *a*, thus securing the utmost accuracy in the starting points from each station.

When the work is done the handles are removed and the tape is coiled into the case represented in Fig. 1. This may be a thin brass box, similar to an ordinary tape box. The central plate, G, is made to revolve about the central pivot, a knob, *k*, serving as a handle to turn it. A flange is turned up on the edge of the plate, G, for the tape to wind around, and a simple arrangement is made for griping and holding the end of the tape which is first pushed into the case. A small slot is cut through the flange, and opposite this is secured a small steel spring, *i*, which, as the end of the tape is pushed under it, presses down and holds the end secure. In order that the end of the tape may enter the slot in the flange, it is necessary that the plate, G, should be turned in the proper position, which is easily indicated by the position of the knob, *h*.

The case serves as a convenient quiver for carrying the pins, *j*, and each time the ten are exhausted, the "out" is marked by turning the plate, G, so that the knob, *h*, will pass forward one figure to the next, and thus the tally is kept in the safest manner possible. A slot is cut in the case opposite each figure for the entrance of the bolt, *k*, which holds the plate, G, securely in position until it is desired to turn it forward.



COLBURN'S EVAPORATOR FOR FURNACES.

The extreme lightness of this tape enables it to be drawn almost perfectly straight with a very slight strain; the compensating arrangement for variations of temperature is exceedingly simple, convenient and accurate; the case preserves the records of the measure in a manner well calculated to insure correctness; and the whole apparatus is certainly the best surveyor's measure that we have ever examined. It has met the decided approval of the most eminent engineers in the country, including that of Professor Bache, of the Coast Survey.

The patent for this invention was granted, through the Scientific American Patent Agency, July 10, 1860, and communications in relation to the instruments, or rights for the manufacture or sale of the same should be addressed to the inventor, W. H. Paine, Sheboygan, Wisconsin.

Improved Evaporator for Furnaces.

We have no doubt that large numbers of persons are suffering from headache, jaundice, liver complaint and consumption caused entirely by living in an atmosphere which is too dry. We have repeatedly had occasion to publish the established fact, that the quantity of water which air will contain varies with its temperature, a cubic foot of air at zero being able to hold but about half a grain of aqueous vapor, while, at 100°, it will hold about 25½ grains. Consequently, cold air contains but little water; and if cold air is heated, its capacity for water being increased, it absorbs moisture rapidly from the skin, lungs and mouth, producing that dry, feverish, uncomfortable feeling experienced by many persons on entering a room heated by a hot air furnace. The principal cause of the injurious effect of furnaces on the health is this drying property of the air, and this may be removed by ample provision for the evaporation of water. We have illustrated several plans for evaporating water in connection with furnaces, and now present another. This plan is applicable only in connection with horizontal registers, but with them it seems to be a most admirable arrangement.

It consists of a porous earthenware vessel, represented in perspective in Fig. 2 of the annexed cut, to be filled with water and suspended in the hot air pipe directly below the register, as shown in section in Fig. 1. The walls of the vessel, A, being porous, the water exudes through them, and forms a thin film of moisture on the outside, which, being subjected to the direct action of the current of hot air, is very rapidly evaporated. To make the evaporation still more rapid, a wick, *b*, is drawn into the earthenware tube, Fig. 4, pierced with holes, which is suspended in the middle, A; the capillary attraction of the wick carrying up the water into the current of air. A neat cover, Fig. 3, with ample openings, closes the end of the pipe. When the water in the vessel, A, is exhausted, it can be very readily renewed by inserting a tunnel through the register and pouring in a fresh supply.

The inventor says that he has introduced this evaporator into many houses, churches, &c., and always with the most complete success, the air becoming soft, agreeable and innocuous. It is also recommended as being calculated to diminish the danger of fires. Large numbers of buildings have been burned by the hot air from furnaces setting fire to the woodwork around the registers; more than $500,000 worth of property, it has been estimated, was destroyed from this cause during a single year, in this city alone.

The patent for this convenient and efficient evaporator was granted, through the Scientific American Patent Agency, on the 22d of January, 1861; and further information in relation to it may be obtained by addressing the inventor, Dr. G. F. J. Colburn, No. 269 Broad-street, Newark, N. J.

GAS ON BOARD SHIP.—Several experiments have recently been carried on at Woolwich and other English dockyards, to test the practicability of using gas as a means of lighting the steam vessels of the royal navy,

Scientific American

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VOL. IV. NO. 7.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, FEBRUARY 16, 1861.

INVENTORS MORE HOPEFUL—ADVICE GRATIS AND ADVICE FOR PAY.

Within the past two weeks the number of applicants for patents has greatly increased, and the tone of the letters from our correspondents in every section of the country indicates a much better state of feeling among this class of our community than had prevailed for weeks before the last presidential election, or has existed since. The apprehension that was so rife among inventors a few weeks ago, that the Patent Office would be seized, the records destroyed, and that patent property would become greatly depreciated, if not rendered valueless, has entirely subsided.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance. Address—

MUNN & Co., No. 37 Park-row, New York.

MANUFACTURE OF COLORS.

A late English traveler among the tribes of wandering Turkomans on the plains of Tarsus and the mountains of Syria, states that the art of dyeing brilliant colors is held in very high estimation among the females of the tribes. Every marriageable girl must have first worked a carpet of more than ordinary beauty, colored with the choicest dyes, as a treasure for her marriage festival. From time immemorial, the art of coloring textile fabrics has been greatly prized. In all manufacturing nations much attention is paid to "color chemistry," because superiority in this particular department is of the greatest consequence to mercantile success. France is distinguished for her silk, woolen and fine cotton fabrics, and the unrivaled skill of her color chemists; and the government of that empire generally selects the first chemist in the country to preside over the royal tapestry manufactory in Paris.

Vegetable substances have been, and are still, the most common coloring agents, but chemists have more recently devoted much attention to synthetical chemistry relating to the manufacture of mineral coloring compounds. When it is considered that almost every article of clothing, and most of the textile fabrics, such as carpets and curtains, that are employed in house furnishing, is colored, the amount of chemicals employed in the arts for this purpose must be prodigious. And when we also consider that some of these chemicals, such as cochineal and indigo are very costly, being from one to two dollars per pound, we can form some idea of the great annual expense incurred for them, especially when, for only three imported dye stuffs, viz., madder, indigo and cochineal, we pay about three millions of dollars per annum. Another reason why chemists have of late years devoted much attention to mineral colors, is the fluctuating supply of vegetable dyes, the most expensive of which are derived from annual crops. If we could obtain all our coloring substances from the same source as that from which we derive our iron, coal and marble, the supply would be constant, and the quantity limited only by the demand. Considerable success has already attended the efforts of chemists in their experiments to obtain mineral colors for textile fabrics, and yet the field for experiment has been merely scratched; it is still very inviting for thorough cultivation.

The bichromate of potash is a pure mineral substance for coloring yellow, and it has almost superseded quercitron bark and fustic; the arsenite of copper is also a purely mineral dye, but it should be prohibited because of its poisonous qualities; but above all these, the most curious and brilliant colors ever obtained, are the new aniline dyes, which are manufactured from that Hottentot perfume and refuse of gas-works, coal tar. With the exception of samples of aniline colors, made to order by Charles Seely, chemist, this city, we believe, that all our dyers have hitherto imported their dyes from London, at a cost of more than sixteen dollars per gallon. It is our opinion that every color now produced on textile fabrics, with vegetable and animal substances, may be imitated and profitably superseded with mineral substances. When this is accomplished, a complete revolution will be effected in "color chemistry."

WHO OUGHT TO BE COMMISSIONER OF PATENTS?

It is now universally admitted that the Patent Office is one of the most important bureaus connected with the government; its proper and efficient administration is therefore a matter of great public concern. The approaching change in the administration renders it certain, also, that changes will occur in the Patent Office, and the now vacant chair of the commissionership will be filled. The President elect doubtless finds cabinet making a difficult trade; but he has no appointment which is more important than this, or one in which he is more likely to commit a blunder.

At the present time there are cliques working like beavers to procure the appointment of some special favorite, who will be expected to use his official position to favor their pet schemes. We have heard the names of two or three persons mentioned for the office, and the friends of each are busy in working up the superlative claims of their candidates, and no effort or scheme will be left untried to secure this appointment for some one who has no other qualification than that which was set forth by the boy, who went West, and wrote back to his father to come out at once as almighty mean men got office out there.

The office of Commissioner of Patents ought to be filled by a dignified and able man, removed, as far as possible, from the dirty trade and slime of party politics: a man upon whom the people can rely for an honest and faithful administration. President Pierce was fortunate in his selection, and President Buchanan was equally so in selecting a successor. Neither of the incumbents referred to were politicians, and both left the office with honor and credit. The President elect is himself an inventor and patentee, and is thereby connected in interest and sympathy with this class of our citizens. We hope, therefore, that he will ignore all partizan feeling in reference to this office, and select a man whose skirts are above suspicion of all complicity with patent schemers and lobbyists. The Patent Office ought never to become a political alms house for seedy politicians, neither ought it to be converted into a guillotine to behead faithful men for mere differences of opinion. Under the administration of a high-toned, honorable man, all these demoralizing influences will be kept out, and its integrity preserved.

AN EVENING AT THE POLYTECHNIC.

Having leisure a few evenings since, we stepped into a meeting of the Polytechnic Association of the American Institute. We were surprised at the popular character of the proceedings. For instance, Dr. Van der Weyde occupied the first part of the evening in an explanation of the principle that the pressure of steam varies with the temperature, employing, to illustrate his remarks, the instrument which forms a part of the apparatus of the academies of this State, and which is, doubtless, familiar to most of our readers.

We discovered that our reporter very judiciously selects the most novel and instructive of the remarks which are made, giving us the cream of the debates. One man, with a foreign accent, proposed a plan, as he expressed it, for firing away the cannon and keeping the ramrod. As cannons are apt to burst after being fired a number of times, he proposed to remedy the difficulty by mounting a solid iron cylinder on the gun carriage, and placing over its end a cast iron cylindrical cap to be fired away as a missile! This was advanced, not merely as an odd original suggestion, but soberly, as a rational plan for the practical construction of artillery.

We have belonged to several associations for public discussion, and they all encounter the one same obstacle to their successful working—the infliction of bores. The English House of Commons overcome this evil by coughing down any speaker whose remarks are uninteresting, and the United States House of Representatives limit the speeches to one hour each. A good presiding officer can do much to save a meeting from being bored by dull and tedious speakers, and the Polytechnic has been very fortunate in securing the services of Professor Mason, formerly of Columbia College, as president. He displays great tact and judgment as a presiding officer, and succeeds in making the meetings very interesting.

On the whole, we found the discussions instructive, interesting and amusing. We were instructed by the president's remarks on the comparative value of coal in New York and Philadelphia, and the prospects of the iron manufacture on the North river; we were interested in Dr. Van der Weyde's description of his pyrometer; and amused with the occasional flashes of wit that enlivened the proceedings.

The meetings of the Association are held at room 24 Cooper Institute, every Thursday evening, at 7 o'clock. No charge is made for admission; on the contrary, the Society would be pleased to see a more full attendance on the part of the public.

Patent Law Suits.

Patentees are often compelled to see their inventions pirated by greedy infringers, simply because they are deterred from seeking the protection of the law for lack of means to defend their just rights. Thus infringers are encouraged to persevere in their rascality, the patentee being unable, from the above cause, to prosecute them as they deserve. Patent lawyers are not very tenderfooted in making their charges; indeed, many a patentee has been squeezed completely dry by these legal gripers. With a view to aid inventors in protecting themselves against both classes herein designated, we have our arrangements complete for affording all needed advice and assistance in prosecuting suits against infringers, and shall be happy to extend our facilities to all who may desire to obtain them.

Hitherto we have not offered to appear in opposition to the Extension of Patents, for the reason that we have usually thought that nearly all patents might be extended for seven years without detriment to the public interest. Hereafter, if parties wish to obtain counsel in opposing the extension of patents, they can receive advice by corresponding with us.

We will give a brief summary of the extent of our professional business, viz., to prepare specifications and drawings for American and European patents, caveats, assignments, powers of attorney, licences, agreements, attend to preliminary examinations, prosecute rejected cases, interferences, re-issues, extension of patents and opposition thereto, give opinions upon

questions of the infringement and validity of patents, attend to appeals and suits for infringement in United States courts, and all other business in connection with patents and patent law.

A NEWSPAPER BEFOGGED—IGNORANCE CONCERNING PATENTS—McCORMICK'S REAPER EXTENSION.

We are often amused at the ignorance evinced by newspaper writers when they discuss subjects pertaining to patents and the administration of the Patent Office.

The *Daily Times*, of this city, has recently taken up for discussion the subject of the extension of McCormick's reaper; and from the space the editors occupy daily in their raid against the extension, the reader would suppose them to be the legal counsel employed by the opponents to defeat it.

The reader of the *Times* would apprehend, from the articles which one day appears in its columns, that the head of almost every department at Washington, from the Executive down, was contriving to get some gigantic scheme through Congress by a special act. Another morning, in taking up the *Times*, the reader finds, under the telegraphic news, a dispatch from Washington taking the Acting Commissioner of Patents to task for refusing to grant an extension of time set for the hearing of the case to allow opponents to the extension to take further testimony, file arguments, &c., adding:—"This proceeding is unusual and significant, and must have greatly astonished the other attachés of the *Census Bureau*." The reporter might, with equal propriety, have said that consternation prevailed among the clerks at the Boston Custom House, who have just as much to do with the Patent Office, and the petition of McCormick for an extension, as the clerks in the Census Bureau.

We do not write this article for the purpose of advocating Mr. McCormick's extension, but to state the facts in the case, so that such of our readers whose ideas may have become muddled by the indiscriminate use of language in the *Times*' articles may understand the nature of Mr. McCormick's application, and to what tribunal it is made.

There are two modes by which a patentee may seek an extension of his patent. The first and legitimate course is to apply to the Commissioner of Patents, any time before the expiration of the original grant, under the provision of the statute of 1836, relating to patents; Mr. McCormick's application comes under this class. The second class, and which we have always considered in a certain sense as illegimate, is to apply to Congress for a special grant.

In applying to the Patent Office for an extension, the law requires the applicant to furnish the Commissioner of Patents with "a statement in writing, under oath, of the ascertained value of his invention and his receipts and expenditures in detail, to exhibit a true and faithful account of loss and profit accruing to him from and by the invention." The law also provides that due public notice of the application shall be published in two or more papers, for the purpose of notifying all those opposed to the extension to furnish testimony against it, and for inviting them to a fair hearing against it on a specified day. Nothing can be fairer than the provisions of this law to all parties; it provides for an impartial trial of the claims of the applicant, and the public and every patentee stands upon equal terms before it.

We have always opposed the extension of patents by special acts of Congress, because such legislation is one-sided; but the extension of patents by the Commissioner, as sought for by Mr. McCormick, comes under a general law, which, if justly dispensed, is equal and just to the whole public. The Commissioner of Patents is bound to hear all such cases and to judge impartially upon the testimony presented before him, whether the extension shall be refused or granted. No other person can judge intelligently in any of such cases, and he is the only person, therefore, recognized in the statute to decide such cases. We have always considered it an act of presumption and a censurable interference with a most excellent law for any public journal to attempt to prejudice the public or the tribunal before whom the application for an extension is made, by prejudging a case the merits of which it knows nothing, while the Commissioner, sitting as a judge, has the evidence of all parties interested, and is bound by his oath of office to administer justice according to the law and evidence produced before him.

The patentees of all great inventions like the sewing machine, electric telegraph, Hoe's printing press, or reaping machine, should be liberally rewarded for the good the world has derived from their discoveries; and we think it the duty of the Patent Office to continue the policy which has governed the Commissioners in their decisions for a few years past.

It is not the amount which a patentee has received in money that should first be taken into consideration as the basis on which the Commissioner is to decide a case coming before him, but it should be first, what is the nature and novelty of the invention? second, to what extent has the public been benefited by the discovery or invention? and, thirdly, has the patentee's remuneration been commensurate to the benefit the public has derived from the invention.

Our position in the case of McCormick is the same as in all other cases of extension under the general law. We think he is as much entitled to a fair hearing, according to the law and facts of the case, as the editor of the *Times* would be if some one should prosecute him for libel; and we should equally reprobate every attempt made through the press to defeat the operations of justice in the one case as in the other, before the evidence was before the court. If McCormick is unable to sustain his case according to law and evidence, he ought to be defeated; and we have no reason to doubt that the Acting Commissioner will do his duty. His character as an impartial officer is undisputed, and all attempts to degrade him by inflammatory appeals ought and will fail. The *Times* is daily advocating the supremacy of the laws; then why does it depart from a plain, straightforward course in this instance? Simply, we believe, because it has confounded a case to be determined by law and evidence with a scheme to lobby something through by political skill.

PRODUCTIVE CONSUMPTION OF WEALTH.

Among our articles of export is oak, or quercitron bark. It is found regularly in the list of articles of which the price current is published, and, like other commodities, it forms a portion of the wealth of the country. A tanner buys $100 worth of this and throws it into his vats, and, after it has lain there awhile, he takes it out in the utterly worthless form of spent tanbark. The $100 of value it contained has departed from it; this amount has been consumed. But at the same time, and in the same process, more than $100 of value has been imparted to certain hides which the bark has been used to tan; the consumption of the value in the bark has been attended by a corresponding production of value in the hides. It was reproductive consumption. This is the character of nearly all the consumption of value which takes place in industrial operations.

A farmer buys 100 bushels of seed wheat and has it scattered abroad upon the ground, where it germinates, and the value that was in it disappears. He also feeds wheat, pork, &c., to his laborers, and pays them wages which they expend for clothing, shoes, &c., all the accumulated wealth or capital of the country. But while this capital is being consumed, the farmer is producing 1,000 bushels of new wheat.

A shipping merchant supplies his vessel with stores, and sends her from New York to Matanzas, in Cuba, with a cargo of flour, to bring back a cargo of sugar. During the voyage the stores are eaten up, and the vessel itself, with its sails and rigging, is slowly rotting away. All this, with the wages of the crew, is consumption of value, or of wealth. But the flour is worth more in Matanzas than it is in New York, and the sugar is worth more in New York than it is in Matanzas, and the change in the location of both of these articles gives them additional value. The consumption of wealth by the expenses of the voyage is attended by a corresponding reproduction.

The publishers of a newspaper buy ink which is used up, and type which are worn out; they pay wages to compositors, and reporters, and editors, and artists, and engravers; but all this expense is accompanied by the production of that most valuable of all things in an intelligent community, a newspaper. The consumption of wealth in the expense of making the paper is reproductive consumption.

The French mechanical papers are full of inventions for detecting the leakage of gas from the joints of gas pipes, fixtures, &c.

Rarey the Horse-Tamer—Exciting Exhibition.

Rarey the horse-tamer has closed his exhibitions in this city, and, in his last appearance but one, he had a severe and trying contest with a large, powerful iron gray horse, with flowing mane, sweeping tail, and proudly stepping foot—a subject exciting to a tamer's ambition, and worthy the exercise of his utmost skill and power. The owner stated that he was not particularly bad—that is, he had never killed anybody—but he was absolutely unmanageable, no one could do anything with him, and he was considered one of the worst broken animals in the country. He was very high, very broad and very long. His eye was quick and full of intelligence; his ears, indicating bad blood, were long and unwieldy; his legs were well shaped and his manner was superb. If, in the fabled horse country, there is a modern Athens, this horse surely should be one of the solid ones of Boston—outside.

The contest did not at once begin. Mr. Rarey, who "knows horse" considerably, saw that he had one to deal with who would stand to his guns for some time, and for whom it was necessary in every way to be prepared. At first Rarey patted him, smoothed him, cuddled him and stroked him. Then he slid his hand down to his hoof, and attempted to buckle the strap around the joint. For some time he was unsuccessful, but finally succeeded. The next attempt was to fasten the fore leg up; this Mr. Rarey usually accomplishes in half a minute, but on this occasion he was delayed at least an hour and a quarter. It was evident that the horse knew what he was about, and what his opponent was trying to do. Several times Rarey succeeded in getting the strap around the leg, and the end of it through the buckle, but before it could be fastened the foot would go with terrific force to the ground, destroying in a second the work of many minutes. At one time it was done, the buckle was fastened, and all seemed secure, when, with an immense effort, the horse by his muscular power snapped the strap as if it had been straw, and stood quietly free again! Gradually he became excited, then angry, and finally frantic, while Rarey, whose pluck and strength are apparently superhuman, worked patiently to the end. It seemed to the spectator as if Rarey must be in great danger, as whenever the horse made the effort to free his leg, he would start violently forward. On one occasion, while Rarey was bending over the knee, the horse rushed forward, throwing him far out toward the center of the ring, and then prancing proudly about the inclosure. Again, when his head was fastened by a leather halter to the fence, he snorted loudly, pulled quickly, and, breaking the strap, jerked the bridle from his head, sprang over the crouching form of his opponent, and ran round the ring as if attempting to jump over. At this time, which was nearly three-quarters of an hour after the struggle began, the contestants were a sight to behold. Rarey's hair was mussy, his face red, and his clothes completely covered with saw dust; while the horse was as wet with perspiration as though he had been thrown into a river. After further struggles of similar nature, and with similar results, Rarey succeeded in running the strap through the surcingle, and in that way fastened the leg. Subsequently, by drawing a second strap, he managed to secure the leg more firmly, but not until repeated efforts had proved unavailing. At last he securely adjusted the strap, and then the second one, and then, of course, the game was up. The horse was soon down, handled, subdued, quieted and caressed. His spirit was not tamed, his fire and strength remained, but he acquiesced cheerfully in whatever was required of him, and played circus with Rarey to the astonishment and delight of all.

PUBLIC DEBT OF THE UNITED STATES.—Statement showing the amount of the public debt of the United States on the 1st of January, 1861:—

Loan of 1842, per Act of April 15, 1842	$2,883,364 11
Loan of 1846, per Act of July 22, 1846	1,000 00
Loan of 1847, per Act of January 28, 1847	9,415,250 00
Loan of 1848, per Act of March 15, 1848	8,988,341 80
Loan of 1858, per Act of June 14, 1858	20,000,000 00
Loan of 1860, per Act of June 22, 1860	*6,842,000 00
Texan indemnity, per Act of Sept. 9, 1850	3,461,000 00
Texas debt, per Act of Sept. 9, 1850	183,785 54
Old funded and unfunded debt	114,118 54
Treasury notes issued under Acts prior to 1857	104,861 64
Treasury notes issued under Act of Dec. 23, 1857	11,795,600 00
Total	$63,709,321 63

F. BIGGER, Register.

TREASURY DEPARTMENT, Register's Office, Jan. 5, 1861.

*This amount will be increased $180,000 in a few days, making the total issue $7,022,000.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association was held, at its room in the Cooper Institute, this city, on Thursday evening, Jan. 31, 1861. The President being absent, Mr. William Lawton was called to the chair.

PROJECTILES.

Mr. JOHN BRUCE gave a description of two projectiles for war purposes. The first was a bomb invented by his son, consisting of a shell of cast iron, suspended in the center of which was another shell of about one-third its diameter, held in its position by 12 or more radiating gun barrels. The interior shell was to be filled with common powder, the gun barrels were all to be loaded, and the space between the two shells was to be filled with what is termed "inextinguishable fire." When fired so as to penetrate a vessel, the inextinguishable fire would set fire to the wood work of the vessel, the frequent discharge of the gun barrels preventing approach to remove it, and the final explosion would shatter everything around. This was presented at the War Department in 1847, but rejected on account of the danger of handling them. The second projectile was invented during the European war, by his son-in-law and himself, and was called the "Peacemaker," its effects being deemed so destructive in their character that the tendency would be to substitute diplomacy for war. It consisted of a boat or vessel to be made of boiler iron, with a bottom nearly flat, and with a deep keel; the hold of which was to be filled with powder and other destructive materials. It was to be propelled by a relay of rockets. Being started in the direction of an enemy's vessel, upon striking the vessel, a pin in the bow of the boat would ignite percussion powder which would cause the contents of the boat to explode. He suggested also that this plan of propulsion might be used in sending a line ashore from a vessel when the sea was too rough for men to venture upon it in a boat.

Mr. SEELY inquired if Mr. Bruce had succeeded in finding an inextinguishable fire.

Mr. BRUCE replied that Mr. Edge, of Jersey City, had a substance so termed, which he stated that water would not extinguish.

MALLEABLE IRON.

Mr. CHURCHILL inquired whether the new method of producing malleable iron by means of zinc, tended to protect the surface of the iron from rust.

No one being prepared to answer this inquiry,

Mr. HASKELL asked for a description of the process.

Mr. SELLOCH replied that the zinc—usually the red oxyd, but the ore which costs much less has been used—was placed in the box with the iron to be made malleable, and they were kept hot. With the oxyd of zinc the process would require about twenty hours; but with the oxyd of iron it would require six or eight days.

Mr. DIBBEN would infer from the appearance of the iron that the zinc did not unite with it, and therefore would not protect it from rust. The theory is that the oxygen leaves the zinc to combine with the carbon of the cast iron, and that the carbonic oxyd and the metallic zinc are expelled by the heat. But as the oxyd of zinc has no greater affinity for carbon than the oxyd of iron, theory would indicate that the time required to decarbonize the iron would depend only upon the degree of heat applied.

Mr. FLEURY had made experiments with the oxyd of zinc, and also with Franklinite ore. He had found an advantage in employing the Franklinite ore, both in the smelting process and in the puddling. He had also applied electricity and nitrogen in puddling, with great advantage. While the iron was at its boiling point, he had passed through it a current of electricity produced by Rumhkorff's induction coil, and had also introduced the carbonates of ammonia to supply nitrogen, which he considered necessary for the toughness of the iron, as well as for the peculiar crystalline structure of steel.

Mr. SEELY said that the decarbonization of iron was always effected by oxygen; but that it was usually derived from the atmosphere, the oxyd of iron assisting rather from its mechanical structure than from its chemical composition. But the oxyd of zinc is decomposed, and therefore it may supply the oxygen more rapidly than the atmosphere.

Mr. FLEURY suggested that the zinc would carry away with it some of the arsenic and sulphur in the iron, and thus leave it purer; and when introduced in the form of an ore, so as not to be so readily volatilized, it might be more able to abstract these impurities. Modern science had led to the belief that nitrogen exists in iron, not separately but combined with carbon, forming a cyanogen. The cost of the electricity in this process was trifling, being principally the first cost of the apparatus.

Mr. STETSON inquired whether the iron produced by this process differed from ordinary puddled iron.

Mr. FLEURY exhibited a plate of the iron, and some nails produced from it; and the latter were pronounced by Mr. Selloch and by Mr. Stetson, after examination, to be of a remarkably good quality. Mr. Fleury stated that the nails were produced with a single heat.

Mr. SELLOCH—Was this rolled from the puddled ball to the nail plate at the same heat?

Mr. FLEURY—Yes, sir; at the same heat.

Mr. SELLOCH—It must have kept its heat a good while, I think.

Mr. FLEURY—That was what I wished to accomplish by this process; to save the reheating of the iron.

Mr. SELLOCH—Have these nails been annealed since they have been cut?

Mr. FLEURY—Not that I am aware of.

Mr. SELLOCH exhibited specimens of steel coated, on both sides, with soft iron.

ELECTRICITY.

Mr. PELL inquired if it had been determined whether electricity pervades iron, or exists only upon the surface. His own idea was that it pervades the iron, fills it to repletion.

Prof. HEDRICK said, that in using electricity we necessarily use it from the surface; but the idea of electricity being confined to the surface seemed to him improbable.

Dr. KNIGHT stated that lightning rods had been known to become fibrous from their exposure to the electric current, the fibres extending throughout; which would seem to indicate that the electricity had pervaded the interior.

Mr. GARVEY said that the phenomenon of electricity could be accounted for satisfactorily, if we reject the theory that it is a fluid, and if we consider it as a vibratory motion of the particles of matter.

FUEL.

Prof. HEDRICK said that independently of the moral aspects of this subject, fuel was hardly second to anything in its material importance. Heat is our most effective motive power, and to produce heat we must have fuel. Combustion is produced by the chemical union of oxygen with carbon, hydrogen or other fuel. It has been proved that the amount of heat developed depends upon the amount of oxygen which enters into combination with the fuel. One pound of oxygen will thus raise 29 pounds of water from 32° to 212°. The theoretic value of fuel depends upon the amount of oxygen it will take up. But, practically, it becomes necessary to make some deductions. For instance, in burning wood the water contained in the wood must be converted into steam, and thus carry off part of the heat. The intensity of heat depends upon the amount of oxygen which is consumed in a certain space within a certain time. Thus in burning hydrogen, a more intense heat can be produced by the oxyhydrogen blowpipe, because it concentrates the combustion. In atmospheric air there are 4 lbs. of nitrogen to be heated for every pound of oxygen consumed. It is important in a blast furnace to regulate the draft, so that there shall not be too much air, because it must all be heated, whether it feeds the fire or not. We may consider the heat of combustion as being merely its liberation, and not its production; for if two atoms of oxygen combining with one of carbon, the three atoms have originally a capacity for retaining, in a latent state, three atoms of heat, and they form one atom of carbonic acid with a capacity for retaining but one atom of heat, the other two are liberated. Coal dust and and saw dust are almost incombustible, on account of the excess of air in them; for the combustible material, at any point, is so little that it will not radiate heat enough to heat the surrounding air, and also heat the adjoining particles to the point of combustion. He had failed in burning a hairspring of a watch in oxygen gas, from its being too fine. In burning wet wood in an open fireplace, if the steam is diffused in the room, it may be an advantage: for heating by steam, theoretically considered, is the most economical mode of warming.

Mr. SEELY said that the intensity of heat was in many cases of great importance, and this can be increased by bringing the oxygen into closer contact. If we burn carbon in oxygen gas we may get a great heat. But if we burn it under a pressure, we may get a still greater heat. Twice the pressure will condense twice the amount of oxygen into the same space, and will produce twice as much heat. Vessels can be constructed which will sustain a pressure of 200 or 300 atmospheres, and thus we may obtain 200 or 300 times the heat; so that clay ought to melt like wax. One of the problems of the age is to crystallize carbon. Perhaps this principle will supply the requisite heat. The same principle can be used in steel furnaces. If condensed air is used the heat will be much increased, and the steel can be operated upon much more quickly. It would be necessary to have crucibles to stand the heat. It is a common notion that metals do not burn easily. Chemically they have a great affinity for oxygen, and if we change their mechanical structure, they will burn readily. Their mechanical structure is such that the heat is conducted away rapidly, so that it is necessary to heat the whole mass before combustion can occur. It is often proposed to use water for fuel. Water contains the elements of combustion, but the hydrogen has already been burned. To separate the oxygen from it consumes as much heat as would be produced by the burning of the hydrogen; and, in fact, a little more, as some heat would be used in this mechanical operation. It has been supposed that water thrown upon a hot fire will increase the intensity of the flame, in consequence of its decomposition; and that wet fuel gives out more heat for the same reason; and these errors have been endorsed by high authority. It has recently been proposed to warm the whole city with hydrogen from the decomposition of water. It will not work; that is, nothing will be gained by the decomposition of the water. It would be very convenient to use gas for heat, if it could be furnished as cheap as coal, instead of our present heating arrangements; so that we could make a fire, or put it out, or regulate it, as readily as we can regulate our light. But gas costs too much to be used in this way.

Mr. GARVEY corroborated the theory that furnishing the air to fire, under pressure, will increase the intensity of the heat. He had succeeded in obtaining any desired temperature by using compressed air in the furnace. A pressure of 15 lbs. above atmospheric pressure would give a uniform temperature of 700°, The highest heat required for ordinary operations is about 2,000°; and by this method, the heat can be raised to 3,000°, or more.

Mr. STETSON inquired whether the intensity of the heat followed the law stated by Mr. Seely, that doubling the pressure would double the heat.

Mr. GARVEY stated that the object he had in view was not intensity of heat, but heat that could be readily controlled. The intensity of heat which could be produced was too great to be measured by any reliable instrument, for it would melt off the platinum of Dr. Van der Weyde's pyrometer. In some of his experiments, the ordinary firebrick was readily fused.

Dr. VAN DER WEYDE exhibited an apparatus to illustrate the theory of combustion in the production of heat and of light, and a new contrivance to regulate the admission of air to the lamp used for producing heat for chemical purposes.

Mr. FLEURY exhibited a new lamp for burning coal oils, which he believed to be excellent fuel, especially for steamships.

On motion, a committee—consisting of Messrs. Garvey and Hedrick—was appointed to examine the above lamp and to report thereon.

The subject of "Fuel" was continued to the next meeting.

The association then adjourned to meet in the rooms of the American Institute, on Wednesday next, at 7 o'clock, the monthly meeting of the American Institute occurring on Thursday.

EDWARD HARRIS, of Woonsocket, R. I., one of our most successful woolen manufacturers, has been in the practice, for several years, of saying to large numbers of his workmen: "For every dollar that you will put in the savings bank, I will put in another in your name." It is impossible for benevolence to be more wisely directed.

Recent American Inventions.

The following inventions are among the most useful improvements lately patented:—

MACHINE FOR FACING AND POLISHING MILLSTONES.

This invention consists in a novel arrangement of cutters, polishing device and gearing, whereby millstones may be faced and polished very expeditiously and in a perfect manner, and the individual blocks of a stone also roughed off and faced before being connected together by simply using a chuck or holding plate. Edmund Munsen, of Utica, N. Y., is the patentee of this invention.

CAOUTCHOUC COMPOUNDS.

R. F. H. Havemann, of New Brunswick, N. J., has obtained two patents for compounds of caoutchouc, intended to serve as substitutes for ivory, bone, &c. They are improvements on the compound of Englehard and Havemann, patented Nov. 29, 1859, and their nature will be understood by reference to their claims. One of the compounds is more suitable for some, and the other for other purposes, according to the hardness desired.

ROLLING TIRE.

The object of this invention is to produce a tire of uniform width all round and with smooth and well finished edges, and the invention consists in the employment, in combination with the ordinary pressing rollers, of a top roller acting on the edge of the tire previous to its passing through between the ordinary pressing rollers, said top roller being arranged in a lever, or connected with some other similar device, to produce the requisite pressure on the edge of the tire. The lever to which said top roller is attached has its fulcrum in a swivel head, which allows of adjusting said roller to the varying diameters of different tires, and flanged guide rollers serve to facilitate the motion of the tire while the operation of rolling proceeds. The credit of this invention is due to S. Jaqua, of Paterson, N. J.

TREADLE.

The object of this invention is to communicate motion from a treadle to the driving shaft of a machine in such a manner that the shaft cannot casually be turned in the wrong direction, and the shaft at the same time rendered capable of being turned immediately under the tread of the foot in any position of the treadle, thereby obviating the difficulty attending the use of the ordinary crank, which cannot be turned from the treadle in the proper direction at once from all points in the path of its rotation. The invention also has for its object the obviating of the concussion attending the movement of reciprocating parts, such as frames, rods, &c., which have hitherto formed an essential element in devices for converting a vibrating or a reciprocating motion into a rotary one, and *vice versa*. The invention consists in placing on the driving shaft two loose collars provided with disks, and connecting the treadle to said collars by means of straps, in such a way that one collar will, as the treadle is vibrated, be rotated on the shaft in a reverse direction to the other, and motion communicated alternately from the disks of the collars to the shaft by means of eccentrics and a fixed pulley or hub, all arranged to effect the desired end. This invention is patented by Warren Glover, of New England Village, Mass.

STEAM PLOWS IN FRANCE.—*Le Genie Industriel* says that some ten steam plows, with 12-horse power engines to operate them, are now being made under the orders of the emperor by Mr. Dickoff, at Bar le Duc. The locomotive is to be placed on one side of the field, the plows to be drawn by an endless chain, the opposite extremity of which is secured by an anchor. The plows are in gangs of eight, four to operate in one direction and four in the other. After each passage of the plows back and forth, the engine and the anchor are moved along at the side of the field a distance corresponding to the width plowed, which is about four feet. This plan was tried several years ago in England.

BREECH-LOADING CANNON.—On page 73 of the present volume of the SCIENTIFIC AMERICAN we expressed the following opinion:—"Such guns are also liable to get out of order by their breech screws expanding by heat and stripping by the recoil of the discharge." In the last number of the London *Mechanics' Magazine* (Jan. 11th) received by us, a correspondent takes the very same view of this question relating to Armstrong guns.

The Elements.

The following table of the sixty-two recognized elements, with their chemical symbols and atomic weights, we give from Wells. The weights of the atoms are compared with those of hydrogen, the latter being one:—

Names.	*Symbols.*	*Atomic weightrs.*
ORGANIC.		
Oxygen	O	8.
Hydrogen	H	1.
Nitrogen	N	14.
Carbon	C	6.
OTHER NON-METALLIC.		
Sulphur	S	16.12
Phosphorus	P	31.4
Chlorine	Cl	35.4
Bromine	Br	78.39
Iodine	I	126.
Fluorine	F	18.74
Boron	B	10.8
Silicon	Si	22.22
Selenium	Se	40.
METALS.		
Potassium (Kalium)	K	39.2
Sodium (Natrium)	Na	23.3
Lithium	L	6.4
Barium	Ba	68.66
Strontium	Sr	43.85
Calcium	Ca	20.15
Magnesium	Mg	12.69
Aluminum	Al	13.72
Glucinium	G	4.
Yttrium	Y	32.25
Zirconium	Z	22.4
Thorium	Th	59.88
Cerium	Ce	46.05(?)
Lantanium	La	36.
Didymium (?)	Di	(?)
Erbium (?)	E	(?)
Terbium (?)	Tl	(?)
Manganese	Mn	27.6
Iron (Ferum)	Fe	27.18
Cobalt	Co	29.60
Nickel	Ni	29.62
Zinc	Zn	32.3
Cadmium	Cd	55.8
Lead (Plumbum)	Pl	103.7
Tin (Stannum)	Sn	59.
Bismuth	Bi	213.
Copper (Cuprum)	Cu	31.71
Uranium	U	60.
Mercury (Hydrargyrum)	Hg	101.4
Silver (Argentum)	Ag	108.3
Palladium	Pd	53.3
Rhodium	R	52.2
Ruthenium (?)	Ru	52.2
Iridium	Ir	98.7
Platinum	Pt	98.8
Gold (Aurum)	Au	199.
Osmium	Os	99.7
Titanium	Ti	24.3
Columbium (Tantalum)	Ta	92.
Pelopium	Pe	(?)
Niobium	Nb	(?)
Tellurium	Te	64.
Tungsten (Wolfram)	W	95.
Molybdenum	Mo	48.
Vanadium	V	68.6
Chromium	Cr	26.16
Antimony (Stibium)	Sb	129.2
Arsenic	As	75.3
Ilmenium	Il	(?)

The amount of money invested in corporate companies, and upon which interest was paid, in Providence, R. I., in the month of January was $15,995,283. The interest thus distributed amounted to $680,921.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 29, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

213.—G. W. Armstrong, of Clinton, N. C., for an Improvement in Water Wheels:

I claim, first, The employment of a vertical shaft, E, which has on its lower portion an enlargement, I J, of the form described, in combination with a centrifugal discharging reaction water wheel, G, and a cylindrical casing, B, in the manner and for the purposes set forth.

Second, The employment of a suspended elastic packing ring, K, in combination with a water wheel, G G', which is supported on a vertical shaft, E I J, enlarged as above stated, and is raised and lowered in the manner and for the purposes set forth.

214.—M. L. Ballard, of Canton, Ohio, for an Improvement in Making Finger Guards for Harvesters:

I claim, first, the combination of a jaw, A, with its plane surfaces, F F', and jaw, B, with its groove, G G', with clasp or ring, C, and wedge, D, or their equivalents, for the purposes stated.

Second, I claim, in combination with the jaws, A and B, the sliding key, E, as and for the purposes set forth.

215.—M. L. Ballard, of Canton, Ohio, for an Improvement in Making Finger Guards for Harvesters:

I claim forming the shoulder of wrought-iron guards or fingers by "staving up" the sections of iron, substantially as described.

216.—M. L. Ballard, of Canton, Ohio, for an Improvement in Making Finger Guards for Harvesters:

I claim a guard or finger constructed in the manner described, whereby the shank and shoulder are formed with accuracy and precision from a section of iron of just sufficient size, in its cross section, to form the shank while the surfaces of the guard on each side of the cutter are faced with a thin layer of steel.

217.—Wm. B. Barnard, of Waterbury, Conn., for an Improved Sash Fastener:

I claim the spring bolt, e, provided with the cam, 3 and pin, 2, taking the eye, 4, in the flange, a, in the manner and for the purposes specified.

218.—G. W. R. Bayley and T. W. Nelson, of Brashear, La., for an Improvement in Draw Bridges:

I claim the construction of draw bridges with one end pivoted upon the abutment and the center of the bridge, supported and moving upon a circular track, all substantially as and for the purposes shown and described.

[This invention and improvement in draw bridges for railways, &c., consists in pivoting a bridge at one end, and constructing and bracing it in a novel manner, and supporting it at its middle upon a rail track of a quarter circle.]

219.—J. M. Bois, of Aurora, N. Y., for an Improved Washing Machine:

I claim the pressure bar, K, having a slot, K', at the center, through which slot, the handle, I, passes to allow the bar to press or bear upon the rounded shoulders, j, in combination and arrangement with the toothed spring D, and notched crosshead, D, rubber, E, handle, I, shaft, G, and side pieces, h, substantially as set forth.

220.—Ludwig Brumlen, of Hoboken, N. J., for an Improvement in the Manufacture of Oxychloride of Lead:

I claim the process, as set forth, in the foregoing description of manufacturing oxychloride of lead from subacetate of lead by the introduction of muriatic acid leaving in solution neutral acetate of lead free to be used over and over for the same purpose.

221.—Joel Bryant, of Brooklyn, N. Y., for an Improvement in Penholders:

I claim the construction and use of ink erasers and penholders, when the same are made and used in combination with each other, substantially as described.

222.—Tisdale Carpenter, of Providence, R. I., for an Improvement in Steam Engines:

I claim, first, In combination with the governor of a steam or other engine, the compound cam, C C', and the rock levers, D D, when constructed and arranged substantially as described, whereby a variable opening and closing of the induction valves is automatically produced by a positive motion, as specified.

Second, I also claim the above combination of the cam, C C', and the rocking levers, D D, with the induction valves of engines when arranged and operated substantially as described as an adjustable cut-off without a regulator to make it automatic.

Third, I claim operating the eduction or exhaust valves in openings in the cylinder heads, said openings being on a line parallel with the motion of the piston, constructed as described, and said valves being worked by a movement separate from the induction valves of the engine.

223.—Fenner Darling, of North Blackstone, Mass., for an Improvement in Pockets of Wearing Apparel:

I claim inserting the gore, C, or elastic cloth, on one side of the pocket, substantially in the manner and for the purpose specified.

224.—T. G. Davis and Joshua Punchus, of Elkhart, Ind., for an Improvement in Stump Extractors:

We claim as our invention the elliptic fulcrum, A, and framed and lever, B C, constructed as described, in combination with the adjustable clevis, G, or claw hook, E, arranged and operating as set forth, which we call the "Pioneer Grub and Stump Extractor."

225.—C. G. Dickinson, of Poughkeepsie, N. Y., for an Improvement in Harvesters:

I claim the employment of the hinged tube, F, in combination with the finger bar, G, sickle bar, f, lever, H, pinions, h k, segment, I, bar, K, and lever, J, when the above parts are constructed and arranged to operate substantially as shown and described.

[The object of this invention is to obtain a simple, economical and efficient means for elevating the finger bar and sickle to enable them to pass over obstructions that may be in their path, and also to enable the machine to be drawn from place to place, the parts being so arranged that the driving mechanism will be automatically thrown out of gear as the finger bar and sickle are raised, and thrown in gear as they are depressed or allowed to descend to their working position.]

226.—Samuel Ehrman, of Mount Joy, Pa., for an Improved Hinge:

I claim a loose-jointed hinge with a pivot, E, projecting equally on both sides of the central joint of the one part, A, with its conic heads and the central joint of B, as set forth for the purpose specified.

227.—Abijah Fessenden, of Boston, Mass., for an Improved Device for Straining Wood Saws:

I claim the projection, l, attached to or forming a part of the frame of the common wood saw and the sliding piece, k, secured to the blade of the saw, and which moves upon the beveled edge of the said projection, the two, projection and sliding piece, being so arranged and operating together that by the upward or downward movement of the sliding piece, the tension upon the blade of the saw can be increased or diminished substantially as above described and for the purposes specified.

228.—A. F. French, of Franklin, Vt., for an Improved Machine for Sawing Shingles from the Block:

I claim, first, The arrangement of the drum, E, and disk, G, with rim H, attached, the drum and disk forming a rotating head in which circular saws, J, are fitted, and the drum, E, serving as a means to rotate ths saws while the latter are presented to the bolt by the rotation of the head, substantially as described.

Second, In combination with the drum, E, disk, G, and rim, H, arranged as shown, the vibrating frame, L, and bolt carriage, M, the frame being operated through the medium of the projections, l m n, on disk, G, and the bolt carriage, M, fed towards the saws by means of the double rack, N, and uprights, i i, substantially as set forth.

[This invention relates to an improvement in that class of shingle machines in which saws are employed for cutting the shingles from the bolt. The object of the invention is to obtain a simple and economica machine that will perform its work very expeditiously and in a perfect manner.]

229.—E. L. Gaylord, of Terrysville, Conn., for an Improvement in Trunk Locks:

I claim the bolt projection, D, in connection with the slot, a, in the plate, A, the case, E, and the hasp, F, provided with a concave or shell at its lower part and a hook, b, all arranged essentially as and for the purpose set forth.

[This invention relates to an improvement in that class of trunk locks in which the hasp or catch enters the lock by closing the trunk, and it is believed possesses many advantages over other locks of the kind.]

230.—W. F. George, of New York City, for an Improvement in Hair Crimpers:

I claim a hair crimping apparatus formed of fluted plates, D D, attached to blocks, A A, and connected at one end by a joint or hinge, B, the blocks being provided with handles, C, and the blocks and handles constructed of wood or other material which is a good non-conductor of heat, all being arranged substantially as set forth to form a new and improved article for the purpose specified.

[This invention relates to an implement or device for crimping at one operation the hair at one side of the head, the necessary number of folds or plaits, five being generally made, and all formed at one pressure, and extending from within a short distance of the central parting of the hair to about the lower part of the ear.]

231.—N. S. Gilbert, of Lockport, N. Y., for an Improvement in Preserve Cans:

I claim, first, The employment of the cam lever, a, as constructed, when used substantially as and for the purpose set forth.

Second, The combination of loop or bale, d, cover, b, pin, c, and cam lever, a, the whole being arranged and operated in the manner and for the purpose specified.

232.—Warren Glover, of New England Village, Mass., for an Improvement in Treadle Attachments for Sewing Machines:

I claim the arrangement of the disks, C C, collars, B B', arms, E, eccentric, F F, straps, H H, and treadle, G, with the shaft, A, hub, D, as shown and described.

233.—H. H. Gratz, of Spring Station, Ky., for an Improved Machine for Indicating Railroad Stations or Streets of Cities:

I claim, first, The arrangement of the slide, G, rack bars, H H, disk, J, provided with pins, x x x, bars or rods, i i, bolt, k, and springs, m d

the several parts being constructed and used as and for the purpose specified.

Second, The employment of the rollers, E F F and D, together with the band, C, when said roller, D, is constructed in the manner represented, whereby the slack of the band or canvas is taken up as it passes from one roller to the other, substantially as specified.

Third, The arrangement of the bolt, k, the pin, z, and the plate, u, together with the apparatus for revolving the canvas, substantially as specified.

Fourth, The bar, P, the spring, W, and the cords, T and R, arranged and used in the connection and for the purpose set forth.

234.—W. M. Hardy and C. W. Hardy, of East Strong, Maine, for an Improved Apple-parer:

We claim, first, The arrangement and combination of the knife, G, lever, d, hinge standard, b', pulley, E, pins, g, dog, f, and arbor, a, as described, so that, by depressing or raising the knife, the arbor, a, is thrown out of or into gear, as may be desired, for the purpose specified.

Second, The arrangement of the screw thread, h, on the sleeve, E, in combination with the spring slide, H, dog, j, arm, k, and fork, e, constructed and operating as and for the purpose specified.

[This invention consists in arranging the knife so that it is held up to the surface of the apple simply by the pressure of the hand, and this knife is brought in such relation to the arbor which produces the rotary motion of the apple that, on depressing the same, the apple, after having been pared, is thrown off by the action of the machine itself, and the fork, which carries the apples, is rendered stationary and ready to receive a fresh apple without being obliged to stop the motion of the treadle, through which motion is imparted to the working parts of the machine.]

235.—Joel Harris, of New Carlisle, Ind., for an Improvement in Water Wheels:

I claim the combination of a compound vertical gate, D, with the water wheel, J, and deflecting plates or water guides, h, the whole being constructed, arranged and operating in the manner and for the purpose specified.

236.—R. F. Havemann, of New Brunswick, N. J., for an Improvement in Compositions of Caoutchouc:

I claim the compound produced by the admixture, in the manner shown and described, of oxyd of zinc with the within-mentioned patented compound of chlorine-treated rubber, or its chlorine-treated allied gums, as set forth.

237.—R. F. H. Havemann, of New Brunswick, N. Y., for an Improvement in Compositions of Caoutchouc:

I claim the compound produced by the admixture of lime, aqua-ammonia and carbonate of ammonia, in the manner described, with the within-mentioned patented compound of chlorine-treated rubber, or its chlorine-heated allied gums, as set forth.

238.—Robert Hitchcock, of Watertown, N. Y., for an Improvement in Winding Clocks:

I claim the arrangement of the flutter wheel, or its equivalent, main spring with its drum or barrel and escapement wheel of the clock upon one and the same shaft.

I also claim the employment, in combination with a winding-up flutter wheel, or its equivalent, of a weight or weights as a substitute for the main spring of the clock by suspending the weight as described, and alternately winding and unwinding it on and from distinct barrels or barrel sections thrown into alternate gear with the barrel shaft, substantially as described.

239.—S. S. Hitchcock, of Chicago, Ill., for an Improvement in Scales:

I claim, first, The combination and arrangement of the main lever, G, hinged bar, D, leg or bracket, B, links, F C, knife edge bearings, L J, and pivotal bearings, f and g, substantially as described and for the purpose set forth.

Second, The combination of the hinged bar, D, main lever, G, and adjustable slide, H, with knife edge bearing on its top, substantially in the manner and for the purpose described.

240.—S. Jaqua, of Paterson, N. J., for an Improved Machine for Rolling Railway Tire:

I claim the employment of the roller, H, lever, I, swivel, J, and screw, d, in combination with the rollers, A B, in the manner and for the purpose substantially as shown and described.

I also claim the arrangement of the rollers, F F, and adjustable carriages, G G, with the rollers, A B H, as and for the purposes shown and described.

241.—William Jones, of St. Louis, Mo., for an Improvement in Hemp Brakes:

I claim the arrangement of the lifter, N, the arm on the drum, D, the cord, a, and spring standards, b, in the manner described, for the purpose of operating the brake, F.

242.—E. M. Judd, of New Britain, Conn., for an Improved Curtain Fixture:

I claim the automatic clamp, substantially as described, by forming it of a drop lever, provided with a projecting and controlling lip, or sustaining branch or arm, so arranged as that the winding tape or cord may be used to keep the clamp from falling into lock in the downward run of the blind, essentially as set forth.

243.—Henry Lanergan, of East Cambridge, Mass., for an Improved Deck Light:

I claim the improved manufacture of glass deck light, as constructed with the several parts, a b c d, thereof, arranged together substantially in the manner and so as to operate together and for the purpose as specified.

244.—J. A. Law, of Meredith, N. Y., for an Improvement in Fire Escapes:

I claim a fire escape ladder, constructed substantially as described, so that it can be secured or made fast at both ends, and strained and held firm and tight for the purposes mentioned.

I also claim, in combination with a ladder so constructed and arranged, the use of the bag or tube, F, substantially as set forth.

245.—J. A. Letts, of Trumansburg, N. Y., for an Improvement in Adjustable Carriage Brakes:

I claim the combination of the lever, M, the crankshaft, L, connecting bar, N, made adjustable by means of the plate, T, and bolt, V, the same acting on the brake bar, O, and the rubber, W, as described.

246.—G. F. Letz, of Chicago, Ill., for an Improvement in Rolling Iron Shutters:

I claim, first, The combination in a rolling iron shutter of the curved ends, a b, the said ends being fitted together, substantially in the manner and for the purposes set forth.

Second, The combination with the hinge joint, s t u, of the pivot rods, e, and friction rollers, d, substantially as and for the purpose set forth.

247.—F. A. Marshall, of Marlborough, Mass., for an Improved Lamp or Candle Stand:

I claim the improved lamp or candle stand, as constructed with the strut, B, and the spring hook, C, arranged and applied to it substantially as and for the purpose specified.

248.—J. J. McComb, of New Orleans, La., for an Improvement in Iron Ties for Cotton Bales:

I claim forming the link or tie with an oblong aperture, one end of which is arrow-shaped, or rather presents two sides of an equilateral triangle; the design of this arrow-shaped end being not only to force the hoop or bend of the hoop over the slot, which it does with unerring precision when the bale expands after being released from the press, but also to secure an equal bearing upon the separate parts of the slotted side of the tie.

249.—Alexander Millar, of New York City, for an Improvement in Cork-cutting Machines:

I claim the semi-circular knife, G, rockshaft, E, spur wheel, H, rack, I, in combination with the reciprocating carriage, C and slide rest, B, when the same are arranged so as to operate substantially in the manner and for the purposes specified.

250.—C. L. Morehouse, of Jackson, Tenn., for an Improved Composition for Lubricating Journals, Axles, &c.:

I claim the lubricating composition described, compounded of the materials in the proportions and manner specified.

251.—Edmund Munson, of Utica, N. Y., for an Improvement in Machines for Facing and Polishing Millstones:

I claim, first, The employment or use of the cutters, g', placed in suitable cutter heads, f', having a rising and falling movement, in connection with the rotary millstone shaft, K, arranged for joint operation with the cutters, g', substantially as and for the purpose set forth.

Second, The arrangement of the adjustable frame, U V, and frame, Q, substantially as shown, so that the former frames, U V, may be raised or lowered, and adjusted relatively with the millstone as desired, and the latter frame, Q, moved horizontally, so that the frames, U V, may be drawn back from above the surface of the millstone when desired.

Third, In connection with the cutters, g', the rotary polisher, B', placed in the frame, V, and arranged substantially as shown, so as to be operated by the same belt, C', which rotates the shafts, X X, in the frame, U, that assist in operating the cutters, g'.

Fourth, The arrangement of the sliding pinion, z, on shaft, H, the belt, M, wheel, J, on shaft, K, the shaft, G, with its screw, e, and wheel, d, and the shaft, F, with its screw, c, and belt, C', passing around the pulleys on the shafts, X X Z, all being arranged substantially as and for the purpose set forth.

Fifth, The chuck or holding plate, B^2, provided with the radial sockets, c^2, and so arranged as to be applied to the rotary shaft, K, for the purpose specified.

252.—A. J. Meyer, of Buffalo, N. Y., for an Improved System of Signalizing:

I claim the combination of motion with a signal or signals (either day or night signals) for out-of-door or field use, as applied to a complete system of field signaling in which all letters or figures, or combination of letters or figures, are indicated by distinct motions or combinations of motions, each motion or combination having a separate and understood value, substantially as set forth.

253.—N. F. Newell, of Northbridge, Mass., for an Improvement in Centering Bars of Iron:

I claim the combination of the chuck with the jaws, operated by levers, bar, treadle, &c., described, for the purpose of centering and squaring up the ends of material to be turned.

254.—Titus Powers, of Philadelphia, Pa., for an Improvement in Locks:

I claim the employment of the described fence, having arms, i j and k, formed substantially as described, when the said fence is so applied to a lock that, on attempting to pick the same, one or more of the tumblers will so act on the fence as to cause the latter to obstruct the withdrawal of the bolt without any strain being exerted on the said tumblers, as set forth.

255.—T. G. Rich, of Milton, Mass., for an Improvement in Ankle-supporting Gaiters:

I claim the described ankle-supporting gaiter, in which a series of strips or ribs, a, of whalebone or other suitable pliant material, surrounds the ankle, and, by extending above the ankle joint, gives the required support to it, substantially in the manner set forth.

256.—C. G. Sargent, of Chelsea, Mass., for an Improved Clothes-dryer:

I claim the arrangement of the rollers, a e, rings, D F, pulleys, J K L M, and rope, I, with the arms, C, braces, E, and swivel head, H, in the manner and for the purposes shown and described.

[This invention relates to an improvement in that class of clothes-drying frames which are so arranged that they may fold up when not in use, and be stowed away in a very compact form. The object of the invention is to facilitate the adjustment of the reel on its arbor or upright, so that the former may be readily raised and lowered and secured at the desired hight.]

257.—Clark Shaw, of East Aurora, N. Y., for an Improved Window Stop and Fastener:

I claim operating the spring stops, l l'', by means of the cams, L L', and knobs, N, the same being arranged and operated for the purpose and as set forth.

258.—J. B. Slawson, of New Orleans, La., for an Improvement in Fare Boxes:

I claim constructing the receiving chamber, C2, of glass plates, c c' d d', in the manner and for the purposes substantially set forth, in combination with the slide, D, and drawer, B, the whole being constructed and operated substantially in the manner and for the purpose set forth.

259.—J. C. Smith, of Troy, N. Y., for an Improvement in Sewing Machines:

I claim, in combination with the needle bar or its equivalent, the revolving sewing plate, H, with its flexible arm, X, and boss, J, so constructed and arranged as to be rotated or turned by hand in directions as desired about the needle and bar as a center of motion, and also hold the cloth between the plate and boss when being sewed, being constructed and arranged substantially, and operating in the manner and for the purposes as fully described and shown.

260.—J. S. Smith, of Lowell, Mass., for an Improved Bed Bottom:

I claim my improved manufacture of spring bed foundation or arrangement of slats, bow springs and hangers, as specified.

261.—P. F. Smith, of New York City, for an Improvement in Neck Ties:

I claim, as a new article of manufacture, the neck tie described.

262.—G. B. Snider and Jas. Gorton, of Yorkville, N. Y., for an Improved Stove Lining:

We claim the lining provided with air passages connecting with the hot air chamber, in the particular manner and for the purpose set forth.

[In some stoves that have their fire pots composed of brick, a space is left for the admission of air between the fire pot and the exterior drum. This construction requires the employment of an inner drum to serve as a supplementary band or pot, in which the brick composing the lining are placed. This improvement consists in constructing the stones, brick, clay, or other non-conducting substances of which the fire pot lining is composed, with air passages in them, thus avoiding the use of the inner drum, and also preventing the air from becoming too highly heated.]

263.—S. C. St. John, of Edmeston, N. Y., for an Improvement in Locks:

I claim the combination and arrangement of the plates, H I, spindles, D G, provided with the projections, b h', the stationary plate, F, pinion, C, and bolt, D, provided with the rack, a, as and for the purpose set forth.

[The object of this invention is to obtain a simple and compact lock, which may be cheaply constructed, and therefore be generally adopted, and still be burglar proof or unpickable.]

264.—Frederick Townsend, of Albany, N. Y., for an Improvement in Breech-loading Firearms:

I claim, first, The combination of the movable thimble, G, the chamber, a a a, the recess or packing chamber, e e, between the front end of the thimble, G, and the rear end of the bore of the barrel, in the manner described and for the purposes set forth.

Second, The method of forming and maintaining, in the manner described, a gas tight joint by the abrasion of material from the bullet against the edge of the barrel and its deposit and compression into a variable recess or packing chamber, formed for its reception between the front end of a movable thimble and the rear end of the bore of the barrel.

265.—A. R. Traber, of St. Martinsville, La., for an Improved Table Fan:

I claim the arrangement of the fan, D, in combination with the standards, C, table, A, and treadle, E, constructed and operating substantially in the manner and for the purpose set forth.

[The object of this invention is to provide the means for producing a draft in any room in which it may be desired, or in any particular portion of a room, and to allow, at the same time, the person engaged in operating the fan to do so with perfect ease and to use the hands for some other occupation, the operation of the fan requiring only a small exertion of the feet.]

266.—J. G. Treadwell, of Albany, N. Y., for an Improvement in Cooking Stoves:

In connection with the damper or valve, H, I claim the plate, J, constructed and arranged as and for the purpose specified.

267.—Emil Trittin, of Philadelphia, Pa., for an Improvement in Lamps:

I claim the combination of the flange or projection, O, the diaphragm, L L, the air chambers, F and G, the wire gauze guards, H and H', the wire gage guard, I, the cover, E, and the tube, S, in the manner and for the purpose substantially as described.

268.—P. L. Weimer, of Lebanon, Pa., for an Improvement in Steam Engines:

I claim the cam-shaped rods, K K', cranks, M M', rod, N, in combination with the latches, F F', for the purpose of regulating the projecting length of said latches from the valve stems, B B', for the purpose as described and specified.

269.—Maurice Wesolowski, of New York City, for an Improved Apparatus for Obtaining Light by Frictional Electricity:

I claim the application and use of bisulphurate of carbon, or any other equally inflammable liquid capable of being decomposed and ignited by an electric spark, and contained in an insulated vessel, in combination with a frictional electric machine, the whole being arranged in the manner and for the purpose described.

270.—H. E. West, of Attleborough, Mass., for an Improvement in Machines for Pressing Bonnets:

I claim, first, The mold, A, to form the bonnet to be pressed, in combination with an expansion block, when the same is made in sections and each section distended simultaneously by means of a wedged block, K, and screw, J, or the equivalents thereof, essentially as described.

Second, The yoke, P, levers, R R, and hooked arms, S S, in combination with the hand wheel, L, when the same are all arranged so as to operate simultaneously with the expansion block, M, for the purposes and in the manner substantially as set forth.

Third, In combination with a block constructed substantially as here in set forth, I claim the elastic covering as and for the purpose described.

271.—E. H. Wheeler, of Keokuk, Iowa, for an Improvement in Harvesting Machines:

I claim the raking attachment, consisting of the railways, A and B, car, D, rake, E, with its arm, c, and roller, i, guide track, F, in combination with the revolving concave, J, arm and roller, K, and guide plate, L, when arranged and operating substantially as set forth.

272.—Ross Winans and Thomas Winans, of Baltimore, Md., for an Improved Anchor Well and Anchor:

We claim an anchor well and windlass arranged substantially as set forth, for the purpose of enabling the anchor to be hoisted directly into the body of the vessel.

We also claim the combination of an anchor well in the hull of a vessel with an anchor having a butt of the proper shape to close the orifice of the anchor well when the anchor is drawn up.

273.—P. H. Woolsey, of Andes, N. Y., for an Improvement in Shingle Machines:

I claim the arrangement of the swinging or moving frame, E, with its rollers, revolving cutter, guide plate and weight, in combination with those of the opposite stationary frame, A, constructed and operated as described.

274.—Linus Yale, Jr., of Philadelphia, Pa., for an Improvement in Locks:

I claim, first, Using a revolving tumbler for a bolt, when the same is used in the described manner or in an equivalent manner, with jointed pins which are the stops or guards.

Second, Reversing the main plate of a pin lock to answer the purpos of an escutcheon, to protect the drawer, &c., from injury by the key.

Third, The flat plane, n n, on the revolving tumbler, for the purpose described.

Fourth, The part, m, for the purpose described.

Fifth, The use of a metal keeper, C, when the same has a front plate to complete the design of the front of the lock.

Sixth, The thin curb around the tumbler instead of the ordinary case of this class of lock, thereby saving metal and cheapening its construction.

Seventh, Placing the projection, a', or spring chamber opposite the bolt hole, so that the drilling thereof may be done from the inside without making an outward opening.

Eighth, The use of, in this class of lock, flat-ended and close-jointed pins with the least possible waste or rounding of corners.

275.—William Burnett, of Boston, Mass., assignor to Robert Burnett, of New York City, for an Improved Steam Pressure Gage:

I claim obtaining an increased or enlarged first motion in pressure gages or indicators through the agency of a bar or arm securely and rigidly affixed to the elastic medium upon which the pressure acts, at a point removed from its center or point of greatest direct motion, and in such a position that a lateral motion of the free end of said bar or arm is induced and employed, through suitable mechanism, to indicate the pressure, substantially in the manner and for the purpose herein specified.

276.—J. B. Gibbs, of Boston, Mass., assignor to himself and John Pearson, of Roxbury, Mass., for an Improvement in Skate Fastenings:

I claim a skate fastening consisting of the lever, D, pivoted at one end to the skate and caught at its other end by a ratchet or equivalent fastening; the drawing down and catching of the lever binding or securing the skate to the foot, substantially as described.

277.—A. Ransom, of Manheim, N. Y., assignor to himself and G. R. Comstock, of Herkimer county, N. Y., for an Improved Machine for Turning Boot Legs:

I claim the series of tubes, T T T T, constructed and combined with their rims, R R R R, substantially as set forth, in combination with the sliding base, C, with its holes, f f f f, and stop pin, F, combined with spring, S, or their equivalents.

278.—Levi Short (assignor to himself and C. S. Pierce), of Buffalo, N. Y., for an Improvement in Vapor Lamps:

I claim the heaters, h', formed on the roof of the burner, so that the jet of gas shall be between them, thereby securing the blue portion of the flame for heating, and the white portion thereof for light, substantially as set forth.

279.—Enoch Weight (assignor to himself, N. G. Simonds and J. B. Clapp), of Charlestown, Mass., for an Improvement in Railroad Chairs:

I claim my improved mode of constructing the chair body, A, with a recess for the reception of the elastic cushion, and applying and arranging such elastic cushion and its cap or supporting plate relatively to the recess and with respect to the bearing surface on which the rail rests—the whole being as above described and as represented in the accompanying drawings.

280.—M. S. Ballard, of Canton, Ohio, for an Improvement in Making Finger Guards for Harvesters:

I claim the device above described, consisting of the part, A, with its jaw, D, shoulder, d', and inclined tongue, E, in combination with the part, B, with its jaw, C, and pivot, a, for the purpose of facilitating the manufacture of wrought iron guards or fingers for harvesters, as set forth.

281.—Lewis Miller, of Canton, Ohio, for an Improvement in Making Finger Guards for Harvesters:

I claim a portable shaping or trueing tool, having the forms of a harvester guard or finger reverse upon it, and in or to which said guard may be clamped by tongs or handles whilst being carried to be heated, formed or wrought into shape, to be easily handled, substantially as described.

RE-ISSUE.

28.—D. S. Wagener, of Penn Yan, N. Y., for an Improvement in Threshing Machines. Patented May 1, 1860:

I claim, in combination with a threshing mechanism inclosed in an outer case, and an exhaust or suction fan inclosed in a fan case, the communicating trunks or passages which connect them, for the purpose of causing all the incoming currents of air to become vehicles for carrying and concentrating the dust in the fan case, from whence it is driven to any proper depository, substantially as described.

ADDITIONAL IMPROVEMENT.

312.—Jasper Johnson, of Genesee, N. Y., for an Improved Gate:

I claim the dropping latch combined with the operating lever as set forth.

Notes and Queries

P. M., of Mo.—There is no metal known which, by being laid upon loadstone, will destroy its attractive power. We do not know where you can get the laws and regulations of the West Point Military Academy.

C. G., of Texas.—The appearances which led you to suppose that the eye is a magnet we suspect were produced by muscular contraction.

F. F., of R. I.—Your plan for a flying machine is very ingenious, as it uses the strongest muscles in the body. No practical flying machine, however, will ever be made to be worked with muscular power. It is doubtful whether a man could sustain himself at all by beating the air; if he could, it would be for only a very few minutes. The first requisite for the art of flying is a light engine.

S. F. J., of N. Y.—It is not very important whether you build your ice house above ground or below, as your principal reliance for the preservation of your ice must be on the thickness and non-conducting material of the walls. We have succeeded perfectly with a small house below ground. Ventilation and drainage are important. Guard, especially, against too much ventilation.

J. D. R., of Pa.—We think your directions for cheese making too incomplete.

A. S. W., of Conn.—We do not know of any process for hardening the surface of finished ironwork without the use of heat. The surface of iron is hardened a little by being rubbed with a burnishing tool, and the whole mass may be hardened by being rolled or hammered while cold.

G. H. J. M., of Va.—Your recommendations to inventors to substitute rotary for reciprocating motion, whenever practicable, we cordially indorse.

W. A. C., of ——.—We shall proceed with your French patent with all possible dispatch. We think that, under the circumstances, you had better take out a Belgian patent also.

E. G. A., of Va.—The improvement which you describe in water wheels we do not consider new. We would advise you, however, to have a preliminary examination made at the Patent Office. You had better procure a copy of our recent work on the Patent Laws. It contains all the information you want in reference to Patent Laws. Send eight three cent stamps.

S. A. B., of Pa.—You are clearly in the wrong. It has been decided in our courts that a patentee of a certain invention—for example, a loom for weaving cloth—has an exclusive right to make and use such a mill; but he can claim no monopoly in the sale of the cloth he manufactures. This, as we understand it, covers the whole point of dispute.

H. & W., of R. I.—Calling Van der Weyde's pyrometer a barometer was simply a mistake of the reporter.

W. I. L., of N. Y.—Draw a large circle on a floor with a piece of chalk, and stand upon the ring, your position representing the north pole of the heavens. Now have a five-cent piece laid down on the floor two feet forward of you, and very near the chalk mark, to represent the north star. Walk forward along the ring, and you will understand how the line of the earth's axis might recede from the present position of the north pole, and still approach the north star. Wherever the axis of the earth points, that, for the time being, is the pole of the heavens.

A. W. W., of Ohio.—We think your trouble arises from your supposing that the crank should be at right angles to the line of the stroke when the piston is at the middle of the stroke. This is not the case. To ascertain the two points in the revolution of the crank when the piston will be at the middle of the stroke, describe a circle with the radius of the crank, then draw a line through the center thereof, and from a point on this line at a distance from the said center, equal to the length of the connecting rod, describe an arc through the said center, and the point where this arc cuts the circle will represent the desired points in the revolution.

H. A. W., of N. Y.—Laughing gas is the protoxyd of nitrogen. It is prepared by applying a moderate heat to pure nitrate of ammonia in a retort. It passes off from the retort in a state of gas, and may be collected over water in a suitable vessel. This gas is colorless, and has a faint smell, with a sweetish taste. By weight, it contains 8 parts of oxygen and 14 of nitrogen. Its action on the human system, when inhaled is peculiar. In most cases, it causes agreeable sensations—a sense of lightness, a brilliant flow of ideas, and a tendency to laughter. The properties of this gas were first discovered by Humphrey Davy, who experienced such peculiar sensations from respiring it that he decla. ed "the atmosphere of Paradise must be composed of it." It is somewhat dangerous to inhale, as it causes a rush of blood to the brain.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Feb. 2, 1861:—

H. N. D., of Cal., $30; W. C. W., of Ill., $25; J. H. S., of N. Y., $55; D. F., of N. Y., $50; F. C. S., of R. I., $30; T. J. L., of Pa., $30; W. T. A., of Iowa, $30; T. & R., of N. J., $75; C. W. T., of Pa., $25; W. & J., of Mich., $55; T. C. Z., of Pa., 50; A. A., of Ill., $40; N. & S., of Conn., $25; A. L., of Mich., $15; P. J. & Sons, of Conn., $125; J. C. T., of Ill., $30; B. W. H., of Mass., $30; C. C., of Ill., $20; S. & S., of N. Y., $25; S. J., of N. J., $25; J. B. S., of N. Y., $25; C. & N., of N. Y., $295; J. A. P., of N. Y., $30; S. M. D., of Tenn., $25; W. H. G., of Maine, $25; F. B. W., of Pa., $30; A. V. R., of Ohio, $25; C. C., of Iowa, $25; E. B. C., of R. I., $30; V. R., of Mass., $10; A. L. B., of Mass., $30; S. L. A., of N. Y., $25; J. A., of Maine, $25; J. McC. G., of Mass., $30; T. & E., of Pa., $20; S. F., of Pa., $110; J. E. B., of N. Y., $30; G. G. S., of Mass., $25; C. E. H., of Conn., $100; E. D. S., of Conn., $30; J. C. B., of N. Y., $30; N. A. R., of Vt., $30; A. G. S., of N. Y., $30; W. B. B., of Conn., $55; J. L. & J. R. P., of Mich., $25; J. M. H., of Miss., $294; B. T. M., of N. Y., $30; J. D., of N. Y., $25; G. N., of N. Y., $30; G. L., of Mich., $25; H. B., Jr., of Pa., $30; A. & B., of N. Y., $30; W. H., of Va., $25; E. B. C., of Ill., $30; I. D. S., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Feb. 2, 1861:—

F. C. S., of R. I.; W. H. G., of Maine; J. L. & J. R. P., of Mich.; C. W. T., of Pa.; J. M. W., of N. Y.; E. C., of Conn.; W. H., of Va.; J. D., of N. Y.; A. C., of Mich.; S. M. D., of Tenn.; J. A. P., of N. Y.; E. A. D., of Mass.; E. T. F., of Mo.; J. H. J., of N. Y.; J. F., of Pa. (3 cases); T. & E., of Pa.; J. L. A., of N. Y.; J. A., of Maine; S. & S., of N. Y.; C. C., of Iowa; A. V. R., of Ohio; I. D. S., of N. Y.; M. J., of N. Y.; Z. F., of Mo.; E. D. K., of N. Y.; N. & S., of Conn.; G. L., of Iowa.

Important Hints to Our Readers.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

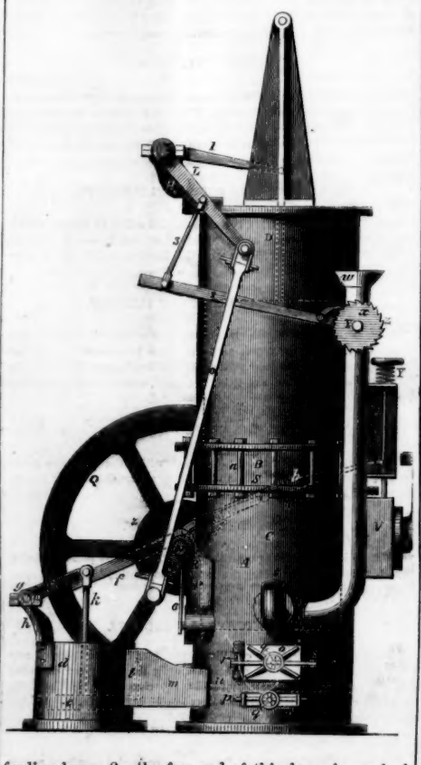
BINDING.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express or delivered at the office, 40 cents.

WHIPPLE'S IMPROVED AIR ENGINE.

Our prophecy that this decade was to be marked by a large number of patents taken out for improvements in the air engine seems to be in a fair way of being fulfilled. The engine of Mr. Whipple, of Boston, Mass., having attracted considerable interest, we here present an illustration and description of it :—

In this invention the main cylinder is composed of cast iron, and has an intermediate portion of its length made of thinner metal than the rest, by which the heat in the upper part of the cylinder is considerably reduced. The piston consists of a hollow cylinder of copper packed at its upper end, and connected by its rod to a crosshead, working in slotted guides bolted to the upper end of the cylinder. A pair of brackets, also fitted on to the top of the cylinder, serve to carry a rocking shaft, which is provided with a lever arm, such lever being cemented by a short link to the crosshead, so that the vertical or up-and-down motion of the cross head will communicate a rocking motion to the shaft. This shaft carries a second lever arm, which is connected by a rod to a crank on the main shaft, carried in brackets bolted to the side of the cylinder, and provided with a fly-wheel. This shaft is provided with suitable appliances for working the piston of an air-pump through the agency of lever arms and a rocking shaft, and also for working the escape or exhaust air valve, through the intervention of a cam and vibrating lever. The pump forces the air under the grate, and through the fire, which is carried on suitable bars at the bottom end of the cylinder. A self-acting fuel feeder is provided, worked from one of the lever arms on the first mentioned rocking shaft, and so arranged as to supply only a small amount of fuel at a time. A convenient safety valve is applied to the cylinder, acted upon by a spring or weight, and a spyhole covered with glass is also provided for the purpose of inspecting the state of the fire.

A represents the main working cylinder, composed of cast iron, but having an intermediate part, B, of much thinner material inserted about its middle, and secured to the upper and lower portions of the cylinder by bolts, *a*, passed through the flanges, *b b*, formed on the intermediate part, B, and upon the junction edges of the upper and lower portions of the cylinder. In the interior of this cylinder, which is parallel throughout, works freely a piston, E, which is packed at its upper end only, that being the coolest portion. This piston is made of copper, and is hollow, being inclosed or covered in at the top and bottom, and is capable of descending to within, say 6 inches of the fuel in the grate. This piston works freely, secured to a piston rod, D, on the upper end of which is secured the crosshead, E, working vertically in the upright guides, F. Bolted to the top of the main cylinder, A, is a rocker shaft working in bearings in the brackets, H, also bolted to the top of the cylinder. This shaft carries a lever arm, I, connected at its free end by a short link, K, to the crosshead, E. A second lever arm or rocker bar, L, is connected to the crank, M, on the main working shaft, N, by the connecting rod, O. One crank only is shown in the engraving; if preferred, two such cranks, with their connections, may be employed, placed one on each side of the engine. The main shaft, N, works in bearings, carried by a pair of brackets, P, bolted to the side of the lower portion of the working cylinder, and is provided with a fly wheel, Q. R is a cam (shown in dotted lines), also fitted on to the shaft, N; this cam actuates the bent lever, S, working on a fixed center at T. To the free end of the lever is connected the spindle, U, which is attached to a blow-off or escape valve contained within the box or chamber, V. A spring, W, and regulating screw and hand wheel, Y, serve to adjust the position of the blow-off or escape valve. Z is a pulley, also carried by the main shaft, and serving to actuate the piston, *e*, of the air pump, *d*, through the link, *e*, and lever arm, *f*, a number of holes being made in the lever, *f*, so that, by connecting the upper end of the link, *e*, to one or other of these holes the stroke of the air pump piston may be varied at pleasure. The lower end of the link, *e*, is connected by a pin joint to the face or side of the pulley, Z, so that, as the pulley rotates, a vertical movement will be imparted to the lever, *f*, which transmits its motion to the piston, *e*, of the air pump through the rocker shaft, *g*, carried in the brackets, *h*, on the top of the air pump and lever arm, *i*, connected to the rod, *k*, of the piston; *l* is a cold air valve (shown in dotted lines), and *m* is a valve box and passage which conducts the cold air forced outward by the descent of the piston, *e*, into the ashpit; *n* and *o* represent respectively the ashpit and fire doors, which are kept tightly closed by the crossbars *p* and *q*; *r* is a catch for holding the end of the crossbar of the fire door in its place, the opposite end of such bar being hinged at S, and turned back when the door is to be opened; *t* is a spyhole, to facilitate the inspection of the fire, without the necessity for opening the fire door; *u* are the grate bars, and *v* is the feeding tube through which the fuel is supplied to the fire. At the top of this tube is fitted a hopper, *w*, and below this hopper is a feeding cup, *x*, carried by the transverse spindle, *y*. This spindle is provided with a ratchet wheel, *z*, which is actuated by a pawl, 1, on the



feeding lever, 2; the free end of this lever is worked by the link, 3, which is connected to the lever arm, L, hereinbefore referred to. By this arrangement, at each stroke of the levers L and 2 the cup *x* will be gradually turned, and eventually inverted, thereby discharging its contents down the feeding tube, *v*, into the fire. 4 is the escape or exhaust pipe, and 5 is a safety valve or pressure regulator, kept closed by the blade spring 6.

THE ROLLING MILLS OF PITTSBURGH, PA.—The Pittsburgh (Pa.) *Evening Chronicle* announces the gratifying intelligence that all the principal rolling mills of that vicinity are in operation, and doing a large business. The *Chronicle* enumerates the following establishments, and the number of hands employed: The Sligo Mill, Lyon, Shorb & Co., 150 men; Pittsburgh Iron Works, Zug & Painter, 175; The Clinton Mill, Graff, Bennett & Co., 300; Jones and Lauth's Mill, 350; the Sheffield Steel Works, Singer, Ninnick & Co., 250; Eagle Mill, James Wood & Co., 250; Hussey, Wells & Co.'s Steel Works, 60; the Duquesne Iron Works, Hailman, Rahm & Co., have resumed with 150 hands; Juniata Iron Works, G. and J. H. Shoenberger, 400; Birmingham Iron Works, McKnight & Bro., 110; Chess, Smith & Co.'s Tack and Nail Factory, 120; Hiawatha Nut Works, Knapp, Wood & Co., 75; the Glender Mill Spike Works, Dilworth, Bidwell & Co., 60; Wayne Iron and Steel Works, Bailey & Brown, 160; Kensington Iron Works, Lloyd, Black & Co., 170; Pennsylvania Iron Works, Everson, Preston & Co., 130; Pittsburgh Steel Works, Jones, Boyd & Co., 80. In the 17 establishments above named, there are altogether 2,995 hands employed, whose aggregate monthly wages must fall but little short of $120,000.

A Milky Sea.

The French Minister of Marine has sent to the Academy of Sciences, in Paris, a report of Captain Trebuchet of the corvette *Capricieuse*, in which it is stated that, on the night of the 20th of August, 1860, when about twenty miles from Amboyna, he and his crew beheld the curious spectacle of the milky sea, and what the Dutch call the winter sea, because the sky and waters present the appearance of fields covered with snow. The phenomenon lasted from 7 p. m. till daylight. It was at first attributed to the reflection of the moon, which was then about three days old; but as the appearance continued after the moon had set, this explanation was discarded. A bucketful of sea water having been drawn up and examined, it was found to contain about 200 groups of animalculæ, of about the thickness of a hair each, but of varying length. They adhered to one another like strings of beads, and emitted a light similar to that of the glow-worm and firefly. It was admitted that the white appearance of the sea was caused by these minute creatures, the number of which must have exceeded all human calculation.

THE specie in the New York city banks, at present, amounts to the great sum of $36,000,000.

FROM THE STEAM PRESS OF JOHN A. GRAY.